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American

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AMERICAN BLACKSMITH

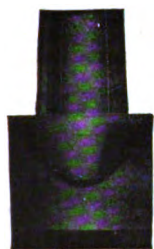
A Practical Journal of Blacksmithing and Wagonmaking 79527

BUFFALO
N.Y., U.S.A.

OCTOBER, 1917

\$1.00 A YEAR
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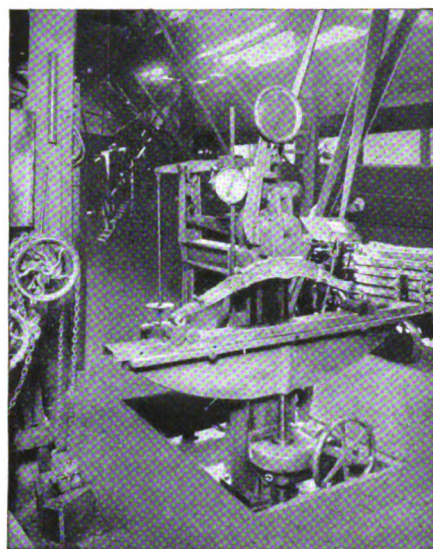
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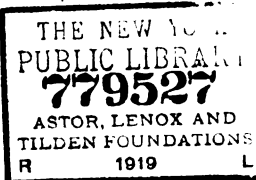
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THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING,
VEHICLE WORK and AUTOMOBILE REPAIRING

VOLUME 17

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BEGINNING THE NEW YEAR

This is our editorial New Year, the beginning of Volume Seventeen. And on the eve of its inception we want to tell our readers what they may expect during the coming months.

We will make it a point, primarily, to keep a constant finger on the pulse of the times—to anticipate changes and new developments in the craft, to inform our readers thereof and to instruct them accordingly to take advantage of every new opportunity that presents itself.

If changes are going on in the craft you want to know of it and be prepared to safeguard yourself against elimination from the great contest of business. Our watchword will be therefore, "Keep up with—and in advance of the times." And we cannot urge you too strongly to "go thou and do likewise."

The best articles procurable will be published. The most reliable authorities will be consulted. And our good old family of craft writers will continue to place before you a feast of their ideas; men you all know—Cran, Bishop, Hillyer, Maloon, Swartz, Camp, Pope, Buckley, Steelman, White, Dunlop, Ost, and many others who need no introduction to "Our Folks." Then there will be noteworthy articles by new friends—articles of vital interest to the craft.

Our New Year promises much and this is our greeting to you, Brother Reader: a happy, profitable New Year, a more successful business than ever, a bigger shop, a larger trade, and a broader outlook on business and life—may they all be yours!

PAINTING THE AUTOMOBILE

More and more of our readers are including automobile repairing and garage work and many are the letters that come to the Editor's desk asking for informa-

tion on one puzzling problem or another. Of late, there have been many requests for information on painting and repainting the motor car and, as there appears to be a vital need for authoritative instruction along these lines, we have endeavored to secure articles which would present a practical discussion on every phase of this subject.

We have been fortunate in enlisting the co-operation of Valentine & Company, paint and varnish manufacturers of New York City, and through their kindness will publish a series of articles prepared by their own factory experts.

The first article appears in this issue and will be followed by a complete series telling how to make the paint-shop pay, describing painting methods and materials, colors and color varnishes and baking systems, and covering the subject of cost-keeping and advertising thoroughly.

We are greatly indebted to Valentine & Company for their courtesy.

It would be an excellent plan, while this series is running, for our readers to write us and tell about their own experiences in this work, describing how they handled this or that job and explaining each step of the work. Such items would furnish a wealth of practical and useful data of immense value to others who are either at present engaged in automobile painting or are contemplating taking up this profitable line.

Subscription Agents

Don't give money to agents unless you are sure who they are. Every authorized AMERICAN BLACKSMITH agent will gladly show you his letter of authority to take your order. When in doubt, send money and order direct to Buffalo, N. Y.

Contents, October, 1917.

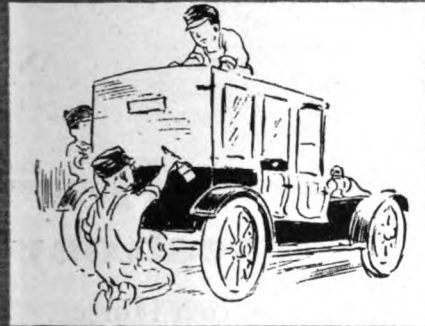
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IN SPITE OF THE AUTO AND TRACTOR, THERE IS STILL MANY A SCENE LIKE THIS.



The Motor Car Paint Shop*



A Series of Helpful Articles on Painting and Re-painting the Automobile

ing country, should give three hundred cars to the car-painters every year for repainting throughout and something like a thousand jobs of refinishing per year.



Two Million Cars To Paint



THE automobile paint-shop man has four good reasons for looking forward to days of great prosperity.

These reasons are:

1—The vast increase in the number of cars. It is estimated that there are now at least 2,000,000 cars in use, with nearly a million to be added this year.

2—The fact that cars are now holding up for several years, mechanically, and are worth repainting, whereas the early crops of automobiles were ready for the scrap-heap after a year or two of service.

3—Advertising and aggressive salesmanship by the motor-car paint-shop, certain to be a feature soon, are going to increase greatly the percentage of owners who will wish to keep their cars attractive and new in appearance.

4—A good paint-shop, capable of quickly turning out well-refinished cars, is of invaluable assistance in solving the "second-hand car problem" for those concerns forced to take in old cars. No matter how good the mechanical condition of a second-hand car may be, a shabby old finish, or a poor job of repainting, will cut many dollars from the legitimate selling-value of the car.

As a maximum possibility the community with one hundred motor-cars should have thirty jobs of repainting from the wood or metal up per year, and one hundred jobs per year of refinishing. The town with a thousand cars to draw on from the town itself, or from the surround-

Nothing like this proportion has held up to now because of the rapid increase in the number of cars, and because up to now the vast proportion of cars have not yet had enough time to grow old.

There has also been the factor in the past that a car went to pieces so rapidly that in a year or two it was not worth repainting. This has all changed, however, and as the manufacturers have learned to make cars that will last, the problem of keeping the automobile in presentable condition has become more and more important to the car-owner.

This series of articles has been written to call attention to this certain great growth of the business and to induce the motor-car paint-shop to go after the new business aggressively and systematically.

It is a guide not only on paint-shop equipment and painting methods and practise, but on these modern but essential phases of the subject, advertising and cost-keeping. Especial stress is laid on the necessity for charging prices for painting work adequate to insure a legitimate profit, and to this end, for keeping accurate cost records.

Quite as important to the success of the modern paint-shop is the securing of a greater and greater volume of new business, and this can only be done by advertising—publicity—making yourself and your work known to the car-owners of your community.

Another phase of the subject which cannot be neglected is the necessity that expert painters be employed, that the best materials be used, and that prompt service be given the car-owner who is always in a hurry; in other words, that the

shop be run efficiently.

The motor-car paint-shop that will get the jobs, do its work properly and promptly, and charge enough to furnish a "living" profit, is going to have a great era of prosperity in the next few years.

When and How to Start a Paint-Shop

An introductory chapter in this series may well be devoted to the problems of the new paint-shop, and of the garage which is considering the question of installing a paint-shop as a part of its equipment for serving its customers and making money.

It is not intended to induce every garage in America to put in a paint-shop.

In many towns and cities the paint-shop facilities are sufficient and in some places there are too many shops.

It should be remembered, however, that the automobile-painting business is destined to have a tremendous growth, for reasons noted before.

It is certain also that many new paint-shops will be established to take care of this new business, and that if they are started right they will make a lot of money in the next few years.

The following articles are all equally applicable to the new garage paint-shop. It is intended here to suggest a few considerations for the garage-man especially, to tell him in plain language what he is up against and what he must do to be saved.

Location Important

The matter of the location of the garage is a most important one. If it is in one of the smaller cities or towns, the garage-man may well consider the character and importance



of the vehicle-painting competition he will be up against. If there are one or more live, up-to-date vehicle-painters who have been willing and able to see the handwriting on the



wall and equip their paint-shops to take care of automobile painting, the garage-man will not have as good an opportunity to establish a paying paint-shop.

In the large city with a great number of cars to draw on, this factor is not of importance. If the garage-man has the room and can get hold of the right human material for his paint-shop and is a good business man, and a wide-awake advertiser, he can build up a big business for his paint-shop against any amount of competition that he will meet.

The next question in importance to that of competition is probably that of the human element. The number of good vehicle-painters is sufficient. The number of good painters who are at the same time good business men is much less. There is a superstition in the trade that vehicle painting is not a paying proposition. As a matter of fact, thousands of vehicle paint-shops are on a paying basis and vehicle painting is a paying proposition. The difficulty is in the human element.

Paint Shop Distinct From Garage

If the garage-man is himself a good business man he may employ a good foreman and good mechanics and run his own paint-shop and make a success of it. On the other hand, if he can get hold of the right man to manage the paint-shop end, a man who has made a success of the business, the best plan for the garage-man will be in most cases to make some arrangement by which the paint-shop is to be run separately. A partnership may be formed, the garage-man furnishing the shop and the painter running it. Or the painter may be hired and given full control. The garage-man who wants to have a paint-shop connected with his garage may look about for a first-class, up-to-date painter who is struggling with a poorly-equipped shop and persuade him to give up

his old shop and move into his garage on one basis or another.

Another question for the garage-man to consider is that of convenience and expedience. Has he more room in his building than he needs for his machine-shop and his storage? If his excess room is on a second floor, has he already an elevator service, or would it be necessary to install an elevator? What proportion of his work is for his neighbors and fellow townsmen, and what part for tourists who wish quick repairs? The man from fifty miles away who stops at the garage to have small repairs made in a hurry is not likely to be a customer of the garage paint-shop. The paint-shop must depend largely on the motor-cars in its own town or county.

Supposing that the garage-man has considered all these propositions and has decided that he wants a paint-shop and will have one. It may be said without hesitation that there is a big, fine, expanding field for the garage paint-shop and the opportunity to make a lot of money not only in the shop, but because the paint-shop can be made an important adjunct to the garage itself.

A Seasonable Opportunity

If the garage is a good one, it is the most natural thing in the world for the car-owner to want his car to be painted where it is stored and where it is repaired. It is also most convenient for the car-owner to have the general overhauling of the car and the painting done at the same time. Furthermore, it is a factor of importance often, that the garage-man with the paint-shop can offer to store the car during the winter months and at the same time paint and have it ready for spring. All of



these factors count in bringing painting business to the garage which has a paint-shop.

To sum up, the garage paint-shop to be successful must not only have the right man behind it and the right man in it and the right location, but it must use good materials, must do good work, must charge enough for its work, and must advertise. (To be continued.)



The Horseshoer

Helps to a Horse

E. H. MALOON

The other day, as I was walking along the street, my attention was called to a pair of black horses, one of which was a beautiful animal to look at. The ground was not good enough for him to walk upon. His head was carried high, his ears alert, his neck arched proudly and his tail carried well out from his body. He was well groomed and in the pink of condition, and he ambled along in lively fashion while his mate plodded. He was all animation while his mate was quiet—although the mate was, no doubt, the better horse for the purpose for which they were being used.

The horse was good to look at. Nature had made him perfect, and the thought came to me that it would be shameful to alter his perfection in any way. Yet that is just what is being done time and time again through careless or ignorant shoeing. There are many such noble animals as this one brought into the shops of readers of THE AMERICAN BLACKSMITH, and I cannot mention too many times that every horse, perfect or imperfect, should be shod as much in conformity with Nature as possible.

In this letter I want to point out how the shoes can help the horse to travel easily.

Let us first picture in our mind's eye just how the bones of his foot are placed and their positions and relation to each other while the horse is in action.

We will draw an imaginary line down the center of the shin bone and note where it lands on the hoof. If you will observe carefully when a horse raises his hoof, you will find that it lands just about where the foot leaves the floor when he has no shoe on. The long and short pas-



terns want to be in line and on a slant, so that a line running through the center of these bones will leave the leg just above the ankle joint. These lines show you whether or not the leg is normal from the ankle down. Where the horse either finds comfort or misery is in the pedal joint and where the perforatus tendon lays over the navicular bone. To my way of thinking this joint is veritably the hinge of the foot. The short pastern, the pedal and the navicular joint form a half circle and it is our business to have the bottom of the foot come onto the floor in such a way that this joint and tendons will undergo no undue strains. I accomplish this as follows: First, when I take up the foot to pare, I pay no attention to the poise of the foot. As I have often said, under all conditions it is safe to remove as much of the hard shell of the hoof as needful without cutting the live tissue of the foot that is the sole. There is absolutely nothing there that requires your knife except the tissue that is past all usefulness and has become dead. It is not always wise to cut too close to the live tissue, as this dead matter will absorb water and retain it to cool such fever as comes into the foot after pounding over hard roads.

After I have removed all of the hoof necessary I look to my lines to see what I must do with the shoe to make them right. And here is where a man wants to use his brain. It is where he uses his skill to the best advantage. For he can either fit the shoe in such a manner that the horse will travel *naturally* and with perfect ease, or just the opposite. No one can tell you exactly how unless he is with you in each individual case.

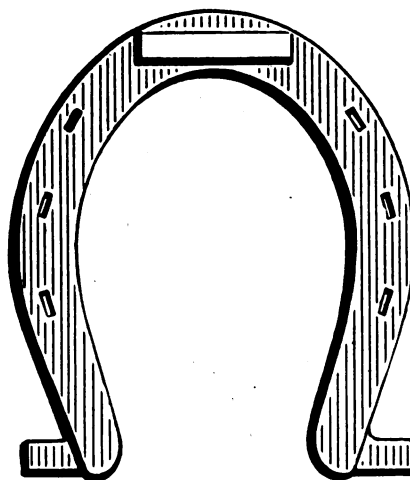
Remember one thing, there are two motions that require power when the horse steps. First he has to fold his foot up and then he has to push it ahead. Now in order to fold the foot up, his first move will be to roll it over on his toe until his leg is over the center of gravity. Then he begins to fold it up by bending at the pedal joint, next at the coronary joint, then at the ankle joint and finally at the knee. After this he propels the leg forward from the shoulder and the leg begins to straighten.

Now as the leg is extended perfectly straight it is ready to land with the foot placed evenly over the ground, perfectly flat and distributing the shock evenly over the whole

foot and leg. This he will do, providing the foot is normal and the shoer has not bungled the job.

Bear in mind that the outside shell stopped growing in size when the horse matured and it is not, therefore, for the shoer to say whether or not the foot is too large or too small. Strictly speaking, he has no right to change it. Nature says it should be so large. His business is to leave it so and remove only what grows downward, and no more, unless special cases, such as some serious foot ailment, warrants. The outside shell is made at the coronary band and Nature's design is to supply hoof from this point as the horse wears it away. In the natural bare-foot state this growth and wear is quite marked.

Now no man can improve on this



A SHOE WHICH GIVES THE HORSE THE BALANCING POWER OF THE WHOLE WIDTH OF THE FOOT

condition with his knife. For the muscles and tendons and ligaments of the horse all determine that his foot shall be just so and it is not for man to say differently. Follow this rule in general and you will be a success as a shoer. Put your ideas against Nature and there will always be something lacking in your success.

Another thing: keep your horses shod with flat shoes as much as possible. Nature's plan is that the horse's foot shall be nearly as wide as long. Now what do we do when we walk up the shoe? Just go to your old shoe pile and pick up at random a few shoes. Lay a straight edge on from the outside of the calk to the outside of the heel. You will likely notice that you have taken off from one inch to one and a quarter inches of the balancing power of the hoof and upon high-heeled calks too. Why, it is far worse for the horse

than the fashionable, small, high-heeled shoes are for the women that wear them. Follow one of them along and see the contortions they go through to keep their feet under them. They would make a more graceful spectacle if they wore longer dresses. It is just the same with the horse on high calks. But the shoer must be governed largely by circumstances. He must usually do as the owner wills. If he is a good workman, he will leave no part of the shell that is not covered by iron and that brings the heels together. If he wings the heels out, he makes a long shoe; and in rough places the horse gets onto it and pulls it off.

There is only one way that I have gotten any satisfaction out of this condition. That is when I get the shoe fitted and bend the heel out at perfect right angles to the width of the shoe. At its widest place I cut the shoe off and put on a calk and have a comfortable shoe for the horse to work in. Try it and you will be surprised to find how few mishaps will occur with this shoe. With it I have successfully shod horses that interfered forward. I have shod a horse that had a weak ankle and used a two-inch calk on him. The horse hauled lumber from a mill in summer and worked in the woods in winter. We had positively no trouble with him.

Some Shoeing Experiences on a Ranch

JAMES A. PATTERSON

On the R. L. Hood ranch, in the southern part of Colorado, where I was employed for two years, the following incidents occurred: The firm kept about twenty horses and a dozen mules, most of them shod all the time. I had plenty of time for doing the work expected of me. When I went to the place there were several horses out of commission on account of different foot ailments; but always enough horses for the work being done to give disabled ones ample time for recovery. During my service as apprentice in Chicago, I had become familiar with the causes and methods of treatment or remedies used for the most common of these troubles. Reference to an old book which I used in apprentice days, and which I still carried in my trunk, gave me useful hints on formulas to use for various diseases; and, without waiting for instructions from the foreman, I began treating



the feet of those horses that required attention.

Among the number was a fine mare that had become disabled by "pulling off" her front feet. The foreman, Jake Weston, wanted to keep her if she could be restored to a normal condition. "What do you think of the chances for getting her into shape for work?" he queried one day.

"With a certain method of shoeing and two weeks' rest she will be ready for work," I replied.

"Go to it my boy, and if you make good on the job there'll be \$5 extra in your envelope next month," responded Jake.

The following day, having little work to do, I brought the mare into the shop after dinner, pared off the loose fragments, made two neat-fitting shoes for the front feet. Hoofs were so badly broken that I could find a place for only two nails in each quarter, and these rather flimsy. Before setting I welded a piece of light band iron to the heels of each shoe, the two ends of the band punched with holes, turned at right angles, meeting in front of hoof close to the coronet, and joined by a tiny bolt which permitted me to draw the band to the right tension; thus reinforcing the hoof and the band likely to hold the shoe in case the nails did not. Also made broad, high toe clips fitting snugly to the oval shape of foot. When let out of the shop, the mare walked very gingerly over to the stable, a hundred yards away. Ten minutes later she came prancing back to the shop and poked her head in at the door. I went to glance at the shoes; she rubbed her nose against my arm apparently in a jovial mood and emitted a low whinny, which I translated into English thus: "Old pard, you did a good job on my feet. I feel like a three-year-old again." A week later she had so far recovered that they put her doing light work, and I got the promised \$5. We kept her shod the same way for four months, removing shoes twice to adjust them for expanding feet. After this period we shod her in the regular way

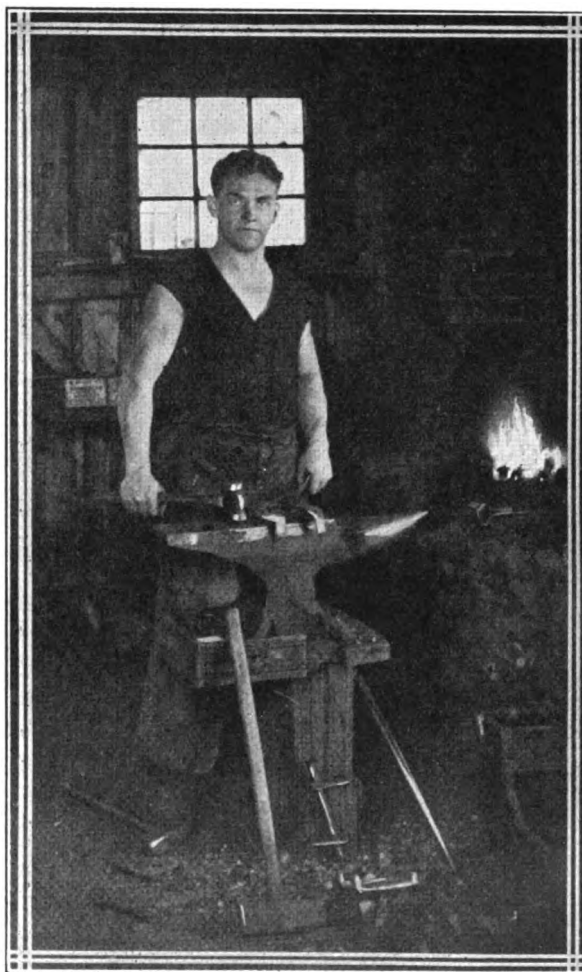
and had no further trouble with her during my time.

At this place also, was a horse named Rufus, that I was shoeing for the first time, lay down on me; not on account of meanness or intention to be ugly; but rather because he was nervous—fearful least something dreadful was going to happen to him. I was trimming off the high front hoof, not expecting anything unusual, when the horse leaned over toward me until he lost his balance

put shoes on Jerry?" By way of priming me on what to expect, he then told me that my predecessor had once tried to shoe him; but that Jerry with a vigorous swing of his head had knocked the smithy down, broke the halter strap and never stopped running until three miles away from the shop. I told him that I would make the attempt.

Next day Weston brought Jerry into the shop himself, hitched him to the studding with a stout rope, saying as he did so: "I'll stick around here a few minutes, you may need some help."

Jerry allowed me to trim up his feet without interfering; but when I placed a hot shoe against his high fore foot he became angry, belligerent, and caught my heavy Madras shirt and a firm grip on the flesh of my back in his teeth; although I hit him several times with the hammer he held me fast until Weston released me by pushing a bar of iron into the horse's mouth and prying his jaws apart. We postponed the shoeing act. Weston sponged off the wound on my back, applied some arnica and sticking plaster. The next day Jerry was brought into the shop again. With three men to assist we muzzled, hobbled, and threw him, then fitted and nailed on four shoes while he lay squirming on his side and frothing at the mouth.



ERNEST WEIKIN, NOW AT CAMP SHERMAN
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and fell, catching both my legs beneath him. No bones were broken, but I was badly wrenched and was laid up a week for repairs.

One of the horses was a five-year-old broncho, named Jerry, with a reputation as an insurgent. He had been broken to the saddle, but had never worked satisfactorily in harness; and it was only in an emergency that he was considered as a possible mate for another horse. One day Weston said to me, "We need an extra team next week to haul some grain to town and fetch back some brick; do you think that you could

The Cruise of an Anvil Pounder—II

WILL BISHOP

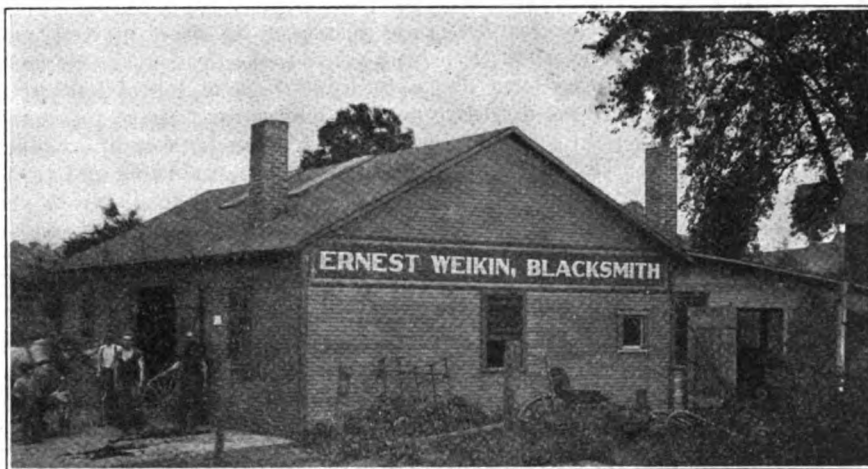
On the sixth day out, we entered the mouth of the Columbia River, which, for some reason unknown to me, chose the line between Oregon and Washington as the place to shake hands with the Pacific Ocean, and she is still using it for that purpose. A few miles up the Columbia we came to Astoria, Ore. There we left our jig-dancing schooner and, a few hours later, took a river boat which was bound for Portland, Ore. We had a little time in Astoria to rubber, and we rubbered. Astoria is a pretty town. The business section is built on piling over the water, and the residence section on a steep hillside overlooking it. The resi-



dents have to climb a flight of steps to get to their front doors, and another flight to get from the back door to the back yard. In Astoria when a woman wants to gossip, or borrow a cup of sugar from a neighbor who lives in the rear, she goes up on the roof, calls the neighbor to the front door and hands her the cup to be filled, or tells her the newest news, as the case may be. They fence their yards with chicken wire to keep the kids from falling out.

The trip by steamer up the Columbia River is one of the most beautiful in the United States. And believe me, it was good for the eyes of us pilgrims that had for six days been looking on all the water in the world. Anyway, it seemed like all of it. The boat we went on was a little stern-wheeler that carried local freight as well as passengers. She fence-wormed back and forth across the river to collect her daily freight, which, for the most part was boxes of salmon and cans of milk. If she failed to stop at a single wharf, wood-yard, or farm between Astoria and Kalama, Wash., where we got off, I was looking the other way.

Those of us who were going to Seattle had to wait for our train about two hours at Kalama, so the wife and I did the usual rubber-neck stuff. We left our luggage in the depot and started up town; but I heard the song of an anvil close by and, you know how it is, I just had to stop and chin a minute with that iron bruiser if it kept me from seeing any more of the sights. There were two shops in the little town—I found 'em both—and business and prices were good. My wife finally dragged me off to the train just in time. We got to Seattle that night and had the big rest in a shore 'nough bed—not a berth. After resting and doing the rubber stuff a couple of days in Seattle, we hiked again. This time it was North Yakima, Wash., a city of twenty thousand on the east side of the Cascade mountains in western Washington. North Yakima is the commercial center of a highly prosperous agricultural district. Here the apple is king, with the spud of Irish nationality the next in rank. All fruits of this climate are successfully grown, however, and grain is also a big crop. There are lots of smith shops in the town, and they command good prices for their work



MR. WEIKIN'S SUBSTANTIAL SMITHY

From North Yakima we came back to Seattle. Then to Tacoma, Wash., the city that was made famous some years ago by the wide-spreading of her boom slogan "Watch Tacoma Grow". She has grown, too, into a busy, thrifty city, and is fast lining up as a ship-building center of importance. Then we took a little boat ride up the Sound to Everett, Wash., the "Smoke-Stack City"; so-called by reason of her large manufacturing industry, especially the number of her shingle mills. Everett cedar shingles cover houses all over the world.

We visited the United States Navy Yard at Bremerton, Wash. Here they build everything that pertains to the Navy but the beans. Approximately four thousand men are hitting the ball night and day building and overhauling fighting ships for our Uncle Samuel. At present, the bulk of the work being done is the building of submarine chasers. After Bremerton we took a train ride for a change. This time we took in the three Washington towns of Kent, Auburn, and Sumner. Kent and Auburn, about five miles apart, are famous for their large milk-condensing plants. Kent is the home of Carnation Milk, and the beautiful, fertile valley surrounding it is where the "content" is put in the cows that furnish the milk for the Carnation brand of milk "From Contented Cows". There are two prosperous smith shops in Kent. At Auburn the Borden people turn out the famous Borden's evaporated milk. So if you don't like Carnation, have some Borden's. Sumner, a little further down the valley; is the center of the berry growing district of Western Washington. Most every known variety of berry is grown here on a

large scale, and the growers are prosperous.

Now, a word about Seattle, and I'll promise to keep still. The people who live here claim that Seattle has everything, and if there was anything else she'd have that, too. And do you know, they are pretty nearly right, at that. I really don't know all the things Seattle excels in, and I haven't space to tell it if I did, so I'll mention the ship-building industry as one of them and try to give some idea of its magnitude. At present, there are four large steel ship-building plants in full operation, day and night, with orders on hand for approximately \$100,000,000 worth of ships, some of which are warships for the U. S. Government. There is another large plant in course of construction and will be in operation in a few months. There are about sixteen thousand men working in the ship-building industry in Seattle. Besides the steel ship construction, there are several plants, large and small, engaged in building wooden hull vessels of all sizes and classes; and other yards planned, and in course of construction. The eight hour day is in operation in all ship-yards, with double time for all overtime; and wages are tip-top.

Blacksmithing is one of the most important branches of steel ship-building. The blacksmith's union here has close to seven hundred blacksmiths and helpers on its membership roll, and about ninety-five per cent. of them work in the ship-yards. The shop in which I work employs about forty blacksmiths and fifty-five helpers. Since going to work here, I have learned some new kinks in our time-honored trade. At some other time I hope to write up for the benefit of the readers of Our Journal some of the ship-smithing



kinks I have grabbed which will be of practical use to the general smith.

Now, in winding up, I want to say that some time I am going back to California; but nix on the lumber schooner—or any other old schooner, boat ship, submarine, or anything that floats on the briny or rests on the bar. I'm a "land-lubber", and a real honest-to-goodness railroad is plenty good enough for William to travel, on thank you.

An Ideal Shoeing, Carriage Repairing and Woodworking Shop

E. H. MALOON

I have been asked from time to time to give my ideas, as a working blacksmith of long experience, on shop plans and methods best adapted to the business. To do this in the most acceptable manner, it seems that a letter addressed to the young man who is just beginning to work at the craft, would be fitting. Hence, it is to him that the following is directed; but I trust that others also—older members, who may have in mind rebuilding or improving their shops, will find a few suggestions of practical worth to them.

As a young man, I traveled over this country quite a bit and visited many blacksmith shops. But I have yet to see one that is perfectly adapted to a mixed business; that is, to horse shoeing and carriage repairing—both wood and iron. For years I have had the picture of such a shop in mind, and I have always intended to build one like it. But somehow I have never been able to materialize my ideal shop. I am in hopes, however, that some of those who read this may profit by the suggestions contained therein, and that my ideas, which are the fruit of years of experience and thought, may find seed elsewhere.

The first step, of course, is to select a locality where the chances for success are fairly good. Here shrewd judgment must be exercised and one cannot afford to be too careful in his choice as his future expansion depends so much on this, as well as his immediate profits.

Locality determined, we need a lot. Don't be stingy in getting this, but pick out a good one—large enough to keep neighbors from settling too near, as there are many things about a blacksmith shop that will prove troublesome to close neighbors.

Having selected the lot, dig a

good basement for a storeroom, making provision to keep it dry and well-ventilated. And over this erect a building that will best suit your needs. One cannot spare too many pains or too much thought in planning this. Use your brains and think well ahead. Look ahead, try to visualize how big a business you can swing and prepare for it accordingly in the beginning.

The shop that I have in mind is 60 feet long from end to end, 50 feet wide—facing the road, and ten feet post with a hip roof; that is, to have the roof built in four sections coming to a peak at the top, and with just enough elevation to shed water quickly. Planed timbers would be used throughout inside and there would be no floor overhead. This would give us plenty of ventilation which would add years to our working lives and insure a degree of comfort that is impossible in the average shop.

We now have a clean floor space measuring 60 by 50 feet—3,000 square feet over all and we will want to divide it up to the best possible advantage. I would work it out as follows:

First lay out a floor space in the front corner, 20 feet wide and 30 feet long—the 20-foot side facing the street. This will be our shoeing floor, and it will be found to be plenty large enough for two men with two forges. We will now erect a partition along the 30-foot side, separating the shoeing floor from our carriage-blacksmith shop which will measure 30 by 30 feet. The remaining space at the rear, measuring 30 by 50 feet, will provide ample accommodation for our woodworking shop and machinery. If you can work out a better arrangement to suit your special needs, do so by all means.

Now for the large tools that we shall need for the shoeing floor. We will want two portable forges and two anvils situated near the partition which divides the shoeing floor from the carriage-blacksmith shop. This gives us the outer wall and light for the horses. Then we will want a Barcus or other good make of shoeing rack, and we will place it at the farther end of the shoeing floor, facing the corner when it is in use. In placing it this way we will lose very little room when it is shut up and folded against the wall. Then we will want a bench and vise for each forge, a small tool bench for each anvil, and two calking vises.

These tools are all that are needed except the small tools that any man will select for himself.

To me this would seem to be an ideal shoeing floor. We have plenty of room for two men and their tools, plenty of light from wall windows and windows in the roof, ample ventilation, good arrangement of our equipment to facilitate system in our work, and insurance against injury from vicious horses, such as every shoer is bound to encounter, with our Barcus shoeing rack. The latter is indispensable to the man who cares at all about his limbs—or his life; and particularly in these days when we are required to shoe so many of the great, green Western horses in use so widely at present. I have one in my own shop and we can shoe anything that travels on hoof with practically no danger to either horse or man.

We will now divide the other side of the building and select our tools and equipment for it. Here we have a space, 30 feet long by 30 wide, with two doors opening on the street. We will take 15 feet of this space adjoining the doors for a working space. This will give us room to haul two wagons onto this floor and make such repairs as they may need, leaving 15 by 30 feet for forge, anvil, vise bench, tool rack, threading machine, drill, punch and shears, tire benders, tire upsetter, etc.

This completes our blacksmithing arrangements and we will now look over our rear room and see what we can do in the way of equipping it with power and wood-working tools.

First, we will install an 8 H. P. kerosene engine. Today this is the cheapest and best form of power for the shop on earth. I have a Foos Kerosene Engine in my shop and find that it will carry a medium load and run dependably for days on a stretch with absolutely no care except oil and water. I have a pump that runs all the time taking water from a nearby river, allowing it to cool the engine by gravity and return to the stream again. My oil cups are so large and reliable that I can leave this engine alone for hours at a time.

Then we will want a universal wood-working machine; a bed, cylinder planer that will drop 7 or 8 inches, a long edger saw machine to allow us to get out carriage poles; and as many more machines of similar character as we feel our business will warrant. This, of course,



will depend largely on the locality we are situated in and the consequent nature of the work we will be called upon to do.

We will keep one end of this room clear for a working floor and install a good bench—say two feet wide and six long, with the top overhanging the frame about four inches all round. This will permit the use of clamps in carriage work. Now under this table we will provide drawers for tools and small stock, such as nails, screws, etc. It would be well to keep this bench a little away from the wall in order that we may work on all sides of it.

There is one machine I would have if I could have gas in the shop; that is a tire heating machine. The best machine of this type I have ever seen was in Goddard's old shop in Boston. By the turn of a lever he puts gas jets enough on a tire to heat it very quickly and evenly and saves lots of time and trouble.

You now have my "picture" shop and I would call it as good as can be

produced. I know that if I had one like it in all particulars, I would be the happiest man in the republic.

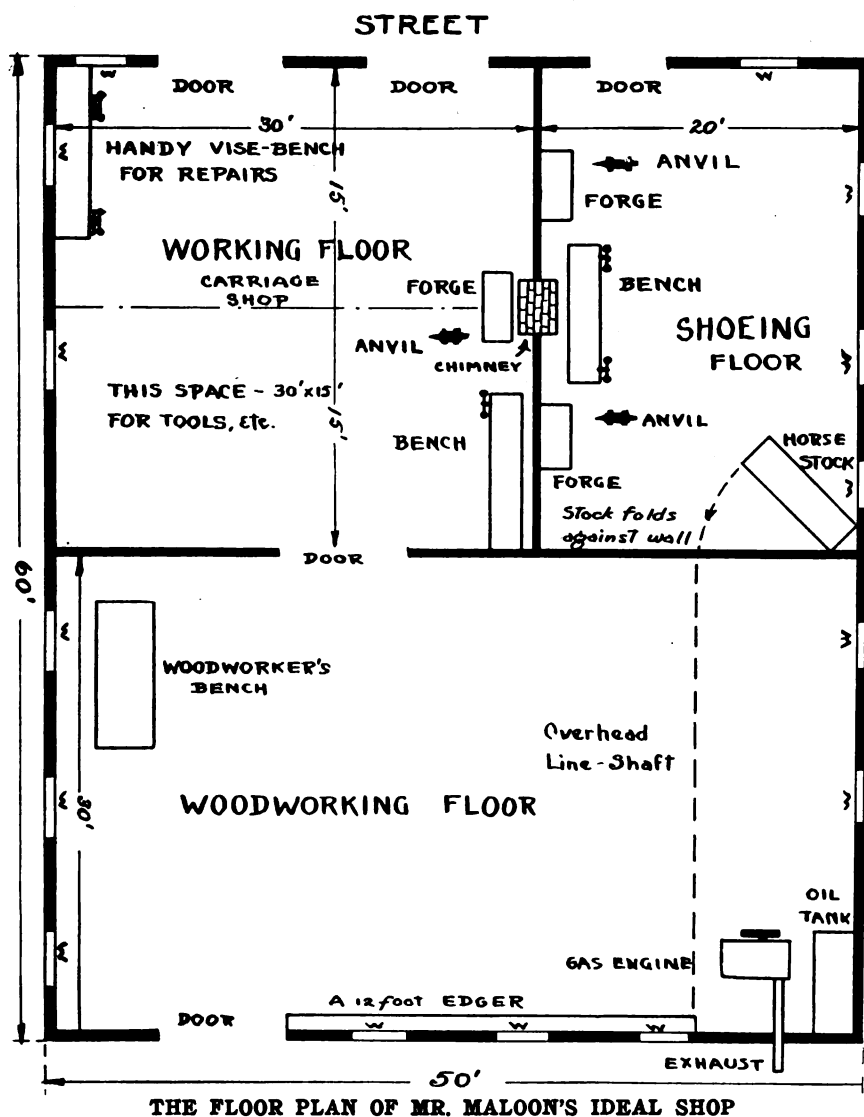
Now as to methods. We have the shop and the next thing is to stock it and run it. In buying my stock, I would select a good jobbing house near home and give it all of my trade as long as they used me right. You will have many occasions to call on your jobber for help unless you have a long pocketbook. Every man has a chance, at one time or another, to do well on some large job that he cannot quite swing alone. Here is where his jobber will help him out if he is worthy of such help.

In stocking our shop we should buy a little of a good many kinds. This we can renew often and thus make a small amount of money go a long way. We have our basement for our stock room and into it we will put bar iron, round iron, bolts, nuts, screws, nails, shoes, etc. Then we will stock up on a quantity of wood of several varieties: oak, ash, maple, birch, hickory, poplar, bass,

pine, and white wood. This all requires money and you must know at the start that a small burden of debt must be carried until you get pretty well under way.

Next we will look for customers. And this is the hardest problem after all—to get good customers, and to hold them. But we have several assets to offer in this connection. First, we have our skill, which is the foundation of our success because that is what we have to sell. But we will use our brains to the best advantage and give our customers the very best we have in us. Never let it be said that another man could do better than you under the same circumstances. Second, we have our integrity—our honesty and faithfulness, no short corners, but always give a man just what you sell him in good measure. Then last—and perhaps most important of all, is courtesy. To my mind that is the greatest getter and holder of business that we have. Toward your customers always carry a smiling face, no matter what the weather or your own troubles, a pleasant word, a steady hand—and you can hold your own against all odds. Courtesy is the greatest lubricant that any man can use to grease the ways of business. It removes that from our lives which demands the heaviest toll from a man—friction and temper. Always in a difference with some one, the cost is far greater than the receipts and no one can afford to play such a losing game.

We'll suppose that we now have our customers and are planning as to the best way to handle them in connection with giving credit. This is almost a question of simply selling for cash or giving away your services—unless you employ the greatest care and keep everlastingly at it. You will have some who will pay cash down every time, some who will ask for honest credit, and others who are dead beats, out and out. My advice is to drop the dead beats as soon as you can discover them; otherwise you will have to earn your money twice to cover the loss incurred through them. Divide your customers into two classes: those who pay cash, and those who want a little time. But when you do give credit, make your customer's credit correspond with his income just so far as you can ascertain same. When bills are due collect them on the day they are due and if you have trouble collecting, drop that particular customer, don't make the mistake of





holding him and giving him honest work when he don't pay on time. If you follow out this policy and give the fullest measure of service and skill, those customers are the very ones who will come back in time and pay cash.

The best word I could offer you is this: be careful who you trust and when you do give time, collect. Otherwise there is only one way left open to you. You must go out of business voluntarily or your own creditors will put you out—not very pleasant to contemplate.

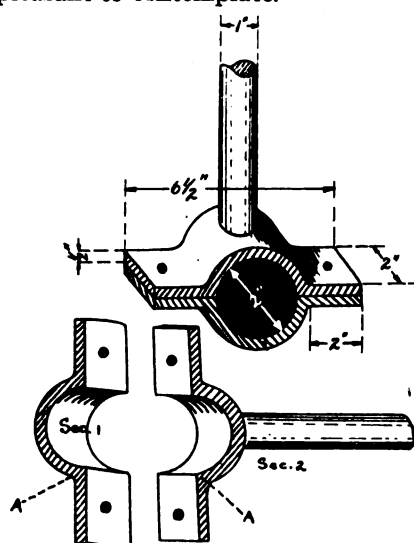


FIG. 1—FORGING A ROD WITH A CLAMP CONNECTION. AT TOP, VIEW OF ROD WITH CLAMP. AT BOTTOM, SEC. 1—BOTTOM SECTION OF CLAMP; SEC. 2—TOP SECTION

Put the Power Hammer to Work—4

WILL BISHOP

In our previous talk-fests on the power hammer we've confined our gab chiefly to hammer tools. But, as I promised in last issue, I'm going to slip you a bit of a chat on forging under the hammer, this time. It may be that some of our hammer-owning readers will find that their hammers are a bit too small to handle successfully the job I have taken for a subject; but, even if such is the case, they'll no doubt get the idea I aim to express, anyway.

As an illustration of the superiority of the hammer over the sledge and anvil in forging, I've chosen for a working example the forging of a rod with a clamp connection. See sketch of the finished job, with dimensions marked, at Fig. 1. No doubt all smiths at some time in their career have been called upon to do this job; and most of them have done the trick by jump-welding the

rod onto a piece of flat and bending the clamp to suit. At Fig. 1, sections 1 and 2, are sketches of the separate halves. Note at A, in each section, the increased thickness of stock in the bend, and the sharply defined corners which insure a perfect circle when the two halves are joined together. Further on you will see how this is accomplished.

Now, as the stock in the clamp is to be $\frac{1}{2}$ -inch thick, and 2 inches wide, when finished, we'll use a piece to make it of 2-inch square stock. We'll cut 'er 10 inches long, and fuller in all 'round the stock about two inches from one end. See Fig 2, Sec. 1, at A. Then we'll slip 'er under the hammer and draw down, at B, till it will go into a one-inch round swage; and when we take 'er out of the swage she'll look like sketch at Fig. 2, Section 2. Now I guess we had better take another heat on 'er. Is she hot? All right; we'll punch a small hole in 'er as per sketch at Section 3, at A. Then we'll lay 'er under the hammer and take a hot-cutter and split 'er, as per sketch. When we've trimmed the rough edges all off with a sharp chisel we'll spread our clamp out in the form of a T, and draw each end of the cross section down to 2 inches wide and $\frac{3}{4}$ of an inch thick. We want a one-inch heading-tool, now, (see Fig. 3) and a block of iron, 3 or 4 inches thick, with a hole one inch, or larger, through it. We'll place the block on the bottom die of the hammer, place the heading-tool on top of the block—wait a minoot! Let's measure the shank on our forging. If she's too long, we'll cut 'er off to say, 4 inches long; then we'll heat 'er up at the point where the shank joins the flat section. Now all we have to do is to slip the shank into the hole in the heading-tool and drop it through to the flat and hammer the flat down to $\frac{3}{4}$ of an inch thick. We could take it out and edge it up under the hammer, but that would necessitate putting back in heading-tool and flattening again; so we'll just take it out and use a sharp hot-chisel to trim the sides so as to leave it 2 inches wide all the way along.

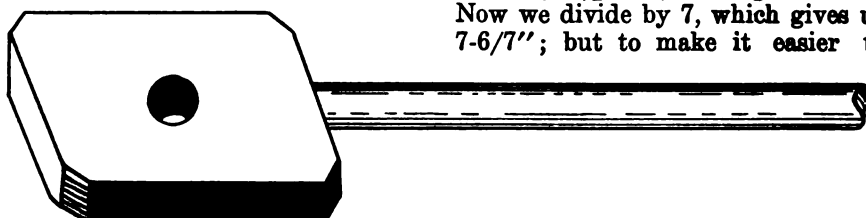


FIG. 3—THE HEADING TOOL USED IN FORGING THE ROD AND CLAMP

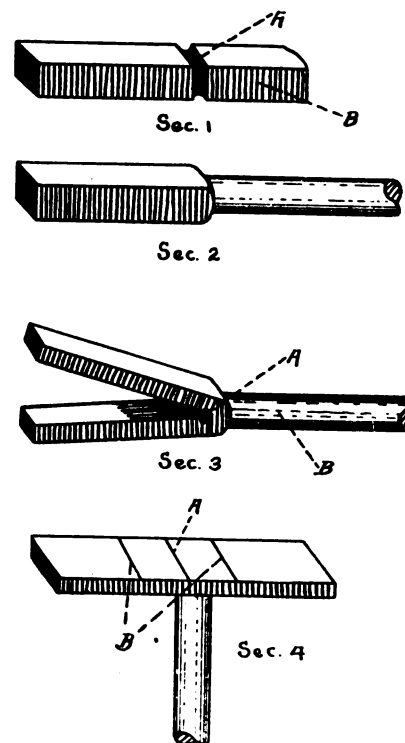


FIG. 2—STEPS IN FORGING THE ROD WITH CLAMP CONNECTION

She'll look like sketch at Fig. 2, Section 4, when we've finished this operation.

Now, we've got to do a little figuring. I hate this figure stuff; and I'll bet you do, too. But it's got to be done; so, if you fellows will use the pencil I'll do the head-scratching. I'm a pippin of a scratcher—had lots of practice. As the clamp we're making, when finished, will be the same as a band, 2 inches in diameter, we'll figure on the basis of the stock it takes to make a two-inch band. Everybody has his own rule for figuring stock for bands, so, as I'm the only guy that's doing any talking in this case, we'll have to use mine. That is her: To find stock required for any circle, just add the thickness of your stock to the diameter of your circle, multiply by 22, and divide by 7. That gives it to a humming-bird's eye-lash; and that's close enough for anybody but the most particular. As the diameter of our clamp is 2 inches, and the thickness of stock is $\frac{1}{2}$ -inch, we simply multiply $2\frac{1}{2} \times 22$, which gives us 55. Now we divide by 7, which gives us $7\text{-}6\frac{7}{7}$ "; but to make it easier to



figure, being close enough, anyway, we'll make it 7-7/8". Now, if it takes 7-7/8 inches of stock to make a 2-inch clamp, it follows that half

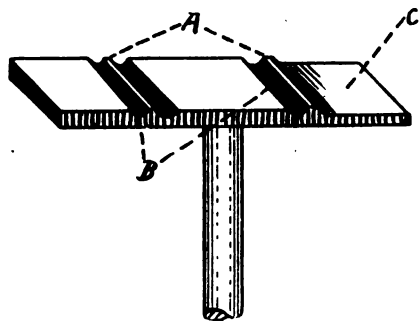


FIG. 4—WHERE TO FULLER BEFORE BENDING THE CLAMP

of that will make half of the clamp; so we just split 'er in two, which gives us 3-15/16; but to make the clamp fit snug, we'll knock 1/16 off and make it 3-7/8; so on this basis we'll work.

The next thing, now, is to figure for our allowance for the increased thickness in our corners. Remember we left the flat in the work we just did 3/4 of an inch thick. I'll now explain the purpose, or at least you'll see it as we go on. Take a look at Fig. 4. The next move in our forging is to make it like the sketch at Fig. 4. But, before we go ahead, we've got to find out how much 3/4 x 2" stock it requires to make 3-7/8 inches of 1/2 x 2" stock, which is the amount we have to leave between the two ribs marked in sketch at A, these ribs being the corners of our clamp when she is bent to finish. Our stock being at present 3/4 of an inch thick, and we want to make it 1/2 inch, which problem we'll solve in this manner: There is a third more stock in a piece of iron, 3/4 x 2" and 3-7/8 long than there is in a piece, 1/2 x 2" of the same length; conse-

2 1/2 inches as the distance we want to leave between the ribs in our forging when we mark it off in the 3/4-inch state. Then, when she is drawn down to 1/2-inch thick it will be 3 7/8 inches between ribs.

Now we'll refer back to the sketch at Fig. 2, Section 4. The next step in the work is to draw a line across the work as seen in the sketch at A; then we measure off 1 1/4 inches on each side of line, as at B. This gives us 2 1/2 inches between the two outside lines, and these lines are to represent the two ribs we want to leave on the work. We'll just make a center-punch mark at each end of the two outside lines; then we'll fuller in about 1/4 of an inch deep on each side of both lines. Note sketch at Fig. 4, at B. That provides for our ribs. Now we'll draw out each end of the work to the required 1/2 x 2", as at C. So far, so good. Now, we've got to draw out that center to 1/2 x 2 inches, and 3 7/8 inches between the ribs. Well, we'll heat 'er up again, dig up that heading-tool and a forging-block and do the trick while you wait. Just cast your eye over the sketch at Fig. 5. That gives the method of doing it clearer than I could explain it. The dotted lines under the sketch at A represent a block with a hole in it which is used to lift the shank at B above the bottom die of hammer. Heading-tool at C, and forging-block at D.

When we are done with the operation represented at Fig. 5, and have the job all trimmed up nicely, we'll bend each end down as per sketch at Fig. 6, at A. We are now ready for the finishing touch on this half of the job. We'll get a piece of 2-inch round iron, heat up the job, and simply bend 'er over the piece

done, and we'll tackle the other half of the job. We can do this half in a very few words. Simply get a piece of 3/4 x 2" stock, rib it same as described above—in fact, finish 'er up same as other half, omitting the shank.

All that is now required is to weld on enough 1-inch round stock to make the rod the length wanted, and we have our rod with clamp connection. Suppose that, instead of a clamp, we wanted a band on the end of the rod. See Fig. 8. To make this, we'd forge the same as for rod half of the clamp, omitting the ribs,

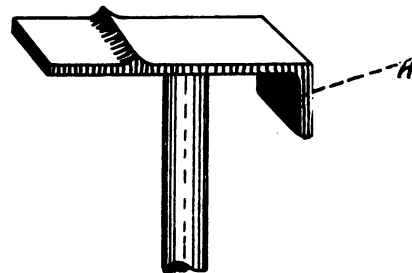


FIG. 6—BEND EACH END AS AT "A"

bend and weld in center. Of course, this applies for any size rod and clamp, or band and rod that is desired.

While I'm on this subject, I may as well mention another little job that is sometimes a bit of a puzzle to some of the brothers. That is the forging of a band with one or more eye-lugs forged out of the solid. See Fig. 9, for example. To do this, the operation is practically the same as for forging the band and rod at Fig. 8. Only, in place of swaging a round end to start, you simply flatten down enough stock to make the eye-lug at the first operation. Note Fig. 9, Section 1, at A. Then you punch hole and split as described above, and spread out into a T. Then insert the part left for the eye into a slot-block like sketch at Fig. 10. Slot at A. From now on, work as if making a plain band. After which, punch hole in lug and finish up eye. All this work is simple, once you get the idea, and if you have a hammer and hammer-tools to do it with.

As I remarked in an article some time ago that I intended to spout about something in each issue of Our Journal until I ran out of soap, or the readers howled to have me choked off, it's up to me now to fulfil that threat. So, if I don't get choked before next issue, I'll be on the job with another spasm in the forging line. I have the reputation of being a loquacious cuss, and I've simply got to live up to my rep.

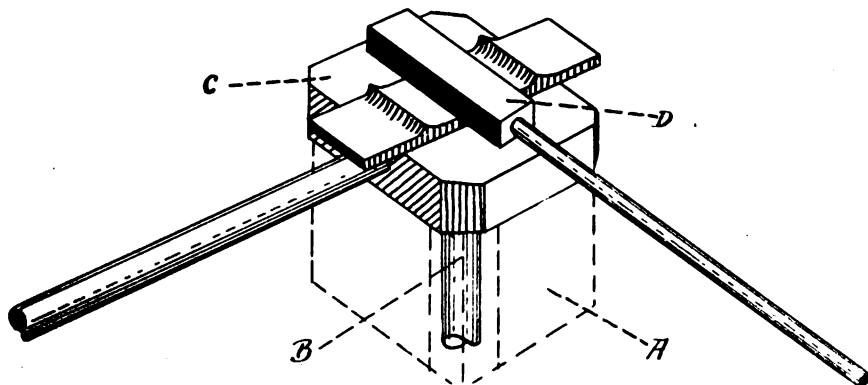


FIG. 5—DRAWING OUT THE CENTER OF THE CLAMP

quently, the thing to do is to cut out that third. And, the third of 3-7/8 is 1-1/4—at least that is near enough—which leaves us approximately

of 2-inch round until she fits nice and snug. See sketch at Fig. 7. 2-inch round at A.

Hooray! The hardest part is



What's the Circumference?

JAMES CRAN

Under the above heading, on page 229 of the American Blacksmith for June, an article and chart appeared claiming to give the circumference

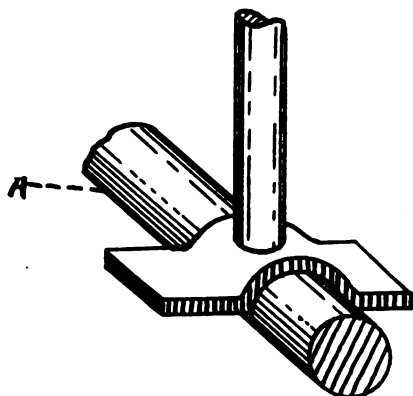


FIG. 7—BENDING CENTER ROUND

of any known diameter in a jiffy. The fact of the matter is that this chart does not give quite the correct circumference of *all* diameters, but merely *approximate* circumferences.

While there seems to be no doubt as to Mr. Near's intentions being of the best when he submitted the article and chart in question to readers of the American Blacksmith, yet he who is at all familiar with figures will realize that this chart, as it appears, is too small to give exact figures, particularly in using the larger numbers; and the smith who tries to use this chart may find himself in difficulties before he proceeds very far.

For instance, let us take the diameter Mr. Near has given—20, which we will assume to be inches in Column A. Now glance across to Column B and here we find the desired circumference to be 62 inches. 62 inches is not the exact circumference of a diameter of 20 inches as the following method (which is correct) will prove:

Multiply the diameter by either $22/7$ ($3\frac{1}{7}$) or the more exact figure 3.1416. The first gives a circumference of $62\frac{6}{7}$ inches; the second, 62.8320. These figures show that the chart is $6/7$ of an inch or $83/100$ of an inch out of the way.

It appears that if one uses the smaller numbers on the chart that the results are quite correct. For instance, take 1 ft. 6 inches in Column A and glance across to Column B where the answer will be found to be 4 ft. $7\frac{1}{2}$ inches. Now figure out what the circumference of a diameter of 1 ft. 6 inches would be. 1 ft. 6 inches equals 18 inches. Multiplying

18 by $22/7$ gives us $396/7$ or $57\frac{4}{7}$ inches; which being transformed into feet gives us 4 ft. 7 inches plus $4/7$ of an inch. As 4 ft. $7\frac{1}{2}$ inches is the figure shown on the chart, we find that this is just $1/2$ of $1/7$ of an inch out of the way, inasmuch as 4 ft. $7\frac{1}{2}$ inches could be written as 4 ft. 7 and $3\frac{1}{2}$ sevenths.

But try some of the larger figures—say 800 or 900 and notice the difference as compared with the smaller numbers. The reason for this greater difference, as we approach the higher numbers, is that the chart is graduated and becomes so small among the larger numbers as to render it impossible to determine with a certainty the exact circumference wanted. Compare the relative sizes of the two columns at 1 in Column A and 3 to 4 in Column B with 100 in Column A and 300 to 400 in Column B. The latter is just 100 times smaller than the former.

It may be well to state for the benefit of those interested in rings and bands that the thickness of the material of which the ring or band is to be made must be added to the inside diameter. For example, a ring or band 20 inches inside diameter made from material 1 inch thick, would have to be figured as 21 inches. This would call for $65.9736''$ or practically 66 inches to make a ring or band the correct size.

For those who are not inclined to figures or those who wish to save the

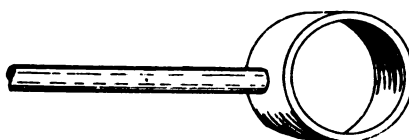


FIG. 8—A BAND ON THE END OF THE ROD INSTEAD OF A CLAMP

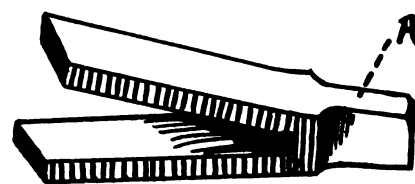
time that figuring would take and still be absolutely sure at all times of having just the right amount of material for bands or rings of any given size, I would suggest using Foden's Tables which are inexpensive, reliable and will give the blacksmith a vast amount of other valuable information. I have used these myself in connection with work of a wide character and always found them to be of great help.

Editor's Note: Foden's Mechanical Tables, referred to by Mr. Cran in the above article, may be obtained through the Book Department of THE AMERICAN BLACKSMITH.

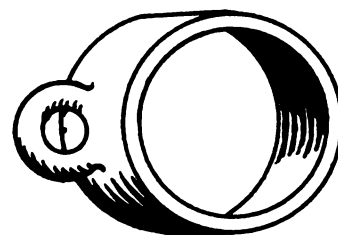
Saving for Uncle Sam and How to do it

Read these vital facts and apply them.

Our wheat harvest is far below normal. If each person weekly saves



Sec. 1



Sec. 2

FIG. 9—FORGING A BAND WITH EYE-LUGS SOLID

one pound of wheat flour that means 150,000,000 more bushels of wheat for the Allies to mix in their bread. Help them to save Democracy.

You can do your part by having at least one wheatless meal a day. Use corn, oatmeal, rye or barley bread and non-wheat breakfast foods. Order bread twenty-four hours in advance so your baker will not bake beyond his needs. Cut the loaf on the table and only as required. Use stale bread for cooking, toast, etc. Eat less cake and pastry.

We are today killing the dairy cows and female calves as the result of high prices. Therefore, eat less and eat no young meat whatever. If we save an ounce of meat each day per person, we will have an additional supply equal to 2,200,000 cattle.

You can do your part by serving beef, mutton or pork not more than once daily. Use vegetables and fish freely. At the meal serve smaller portions, and stews instead of steaks. Make made-over dishes of all leftovers. Do this and there will be meat enough for every one at a reasonable price.

Save the milk. The children must have milk. Use every drop. Use buttermilk and sour milk for cooking and making cottage cheese. Use less cream.

If everybody uses one-third of an ounce less per day of animal fat 375,000 tons will be saved yearly.

We are the world's greatest fat wasters. Fat is food. Butter is essential for the growth and health of children. Do your part by using butter on the table as usual but not



in cooking. Other fats are as good. Reduce the use of fried foods. Save daily one-third ounce of animal fats. Soap contains fats. Do not waste it. Make your own washing soap at home out of saved fats.

1,100,000 tons of sugar a year will be added to the world's supply of sugar if everybody in America saves one ounce daily.

Save the sugar. Sugar is scarcer today than ever. We use three times as much per person as our Allies. So there may be enough for all at reasonable prices if we save rightly. Use less candy and sweet drinks. But do not stint sugar in putting up fruit and jams. They will save butter.

Save the fuel. Coal comes from a distance and our railways are overburdened hauling war material. Help relieve them by burning fewer fires. Use wood when you can get it.

Use perishable foods. Fruits and vegetables we have in abundance. As a nation we eat too little green stuffs. Double their use and improve your health. Store potatoes and other roots properly and they will keep indefinitely. Begin now to can or dry all surplus garden products.

Use local supplies. Patronize your local producer. Distance means money. Buy perishable food from the neighborhood nearest you and thus save transportation.

Keep in mind these general rules:
Buy less, serve smaller portions.
Preach the "Gospel of the clean plate."

Don't eat a fourth lunch.
Don't limit the plain food of growing children.

Watch out for wastes in the Community.

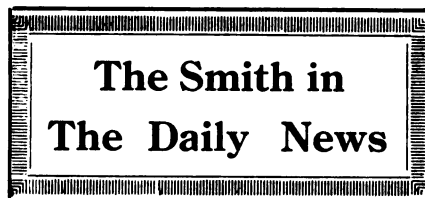
Full garbage pails in America mean empty dinner pails in both America and Europe.

If the more fortunate of our people will avoid waste and eat no more than they need, the high cost of living problem of the less fortunate

will be solved.

As the head of your house see that members of your family are acquainted with these facts and rules and do your part in enforcing them.

"Win the war by giving your own daily service."



Odd Mention of Anvil Ringers and Knights of the Forge in the News of the Day

Shameful!

Dock Hocks, an accomplished blacksmith of Brocton, Mass., has been censured for wearing his sleeves rolled up in public places every Sunday. It is rumored that he does it to show his muscles. He claims he has got as much right to do that as the girls have to wear short skirts for the same purpose!

Another Divorce Case

Anna Smith, the village blacksmithess of Muskogee, Okla., was granted a divorce from William Smith, her ornamental husband. Mrs. Smith stated that she married in Antlers, Okla., December 15, 1906, and since that time was compelled to do the hard work in her husband's blacksmith shop while he was out drinking and carousing. Custody of their child, Gladys Smith, was awarded to the mother.

Watch Out for Your Jobs, Boys!

A report from New Hampshire says that a young lady of that state has become a full-fledged blacksmith and is shoeing horses as well as any of 'em. Her only previous experience had been in shoeing hens.

Classes for Navy Shipfitters, Shipwrights, Blacksmiths and Painters and Qualifications for Applicants

1.—An applicant for the shipfitter class should have had experience as a metal worker, be able to lay out work; know how to chip and calk and drive rivets; understand the various rules for drilling and tapping; have some knowledge of pumping and drainage and be familiar with the required tools and their usage and care.

2.—Applicants for the shipwright class should have some practical experience in carpentry and know the names of the tools used. The instruction is along the same line as for shipfitter, with the addition of cooperage, joiner work, repairing boats and spars, calking seams in wooden decks and cutting threads on bolts with hand dies.

3.—For the blacksmith class, a candidate must have had some experience at the trade. He is taught welding in different ways, "jumping on" pieces, working angle iron, making shackles, chain, bolts, rivets, mast-bands, eye-bolts, padeyes, iron work for blocks and all the fittings likely to be required on board ship which would have to be made with a forge. Blacksmiths are also given special instruction in shackling and unshackling.

4.—A candidate for painter must have had some experience as a painter and must know the rules for mixing paint and applying it. He is taught painting of iron and woodwork inside and out, cabinet and hardwood work and the mixing of all kinds of paint and stain by different formulae used in the naval service. He is required to keep a journal in which he gathers much general useful information on ship painting generally.

Capable Men Needed at U. S. Navy Yards

The United States government is in urgent need of capable men for positions in the navy yards. Men are needed at the following naval yards for these positions and application blanks for them may be secured at most local postoffices:

Brooklyn, N. Y., 49 shipbuilders; Charleston, S. C., six boatbuilders and six chippers and caulkers of iron; four shipfitters and eight shipwrights; Norfolk, Va., five coppersmiths, 18 sailmakers, 37 shipfitters and 18 blacksmiths; Philadelphia, seven boilermakers, 22 coppersmiths, 12 drillers, six holderons, 26 painter's helpers, 7 rivet heaters, 5 sailmakers, 76 shipfitters, and 39 shipwright's helpers; Washington, D. C., two canvas workers and 60 all-around machinists; Portsmouth, N. H., 7 boatbuilders, 3 boilermakers, and six shipfitters.

New York Blacksmiths Raise Prices

On account of the high prices for materials of all kinds the blacksmiths of Owensboro and Daviess county, N. Y., have again been forced to advance the prices for horse shoes. In the future four old shoes will cost \$1; new shoes, \$1.50; toed shoes, \$1.75. The new prices took effect September 1. The old rates were seventy-five cents for four old shoes; \$1.25 for new shoes and \$1.50 for toed shoes.

Mass. Smiths to Fix Prices

Taunton master blacksmiths and horse-shoers have met and formed a union and fixed a scale of prices for shoeing. According to the shopkeepers the cost of everything that enters into the line of supplies for their work has more than doubled in a short time and higher prices will have to be charged if they are to keep in the business.

Blacksmith's Car Burned Up.

A wooden car built by George W. Enos, of Connellsville, Pa., for use at coke and coal plants, was found in ashes one morning by Mr. Enos when he looked for it to ship it off. Mr. Enos has been making a number of these cars for the coke operators. This one, when completed, he placed in a field ready for shipment the following day.

People nearby, it has been learned, used the car as a place in which to burn their paper and rubbish, and the car was evidently burned up during one of these bonfires.

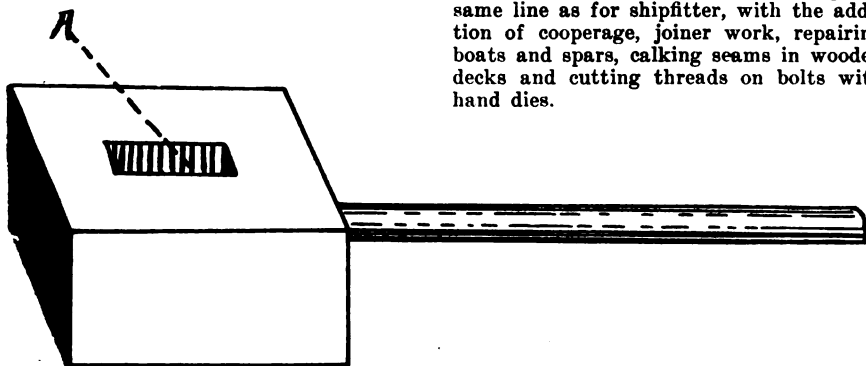


FIG. 10—A SLOT BLOCK FOR FORGING THE EYE-LUG

The Price Cutter

(Apologies to Longfellow.)

Tell me not in smiling numbers
Selling costs are what they seem
And the man who cuts for orders
Gets the lion's share of cream.

If you strive to build a business,
Do not be a human sieve—
Letting leak your needed profit,
Trusting luck will let you live.

Lives of dead ones all remind us
What it means to sell on guess;
Their departure makes us keener
To sell right and not sell less.

For no trade can long be loyal
To a man who's all regrets—
Can't deliver—who's just living
On the interest of his debts.
—"Meteco Meteor."



Heats, Sparks, Welds

Business as usual—only more so.

Co-operation, not competition, is what's needed in business.

Don't think that team-work means tandem—with the high-stepper in front.

Money makes the war go. Remember the second issue of the Liberty Loan.

It's a bad policy to wait until after the fire before looking up your insurance to see how it stands.

Cheating yourself is bad business. How about that vacation you've promised yourself, brother?

You'd hardly call "Our Journal" a newspaper. Yet the ads contain a lot of news. Read them and find out.

Funny the way some things seem. Ferinstance: the keener the smith the slower he is to cut prices!

Say man, you've got a hand on the end of your arm—just let others feel its friendly grasp occasionally.

Mebbe the big business of the present is war, but other business is necessary to support it. Doin' your part?

It's our own gray hairs that are caused by devotion to duty. The other fellow's are developed by dissipation.

"Speakin' of full measure," says old

Uncle Zeke, "An ounce of performance is better'n a hul pound o' promises."

Bury that grouch of yours. This world is meant for live ones and live ones don't go around wearing a grouch 'til kingdom come.

Bread is the staff of life and advertising is the bread of business. Keep feeding your business regularly and liberally with it and watch it grow.

Education is a good thing, we'll all agree. And one way of getting a good shop education is preserving and reading the catalogs of the trade.

The less work, the greater the proportion of overhead each job must carry. Remember this when you are tempted to take a job at a cut price "just to keep busy."

Let's see, wasn't it the Grand Old Book that said: "The beauty of the house is order?" An excellent thing to apply to your business and your shop, Mr. Blacksmith.

Apply the same reasoning to business and then work accordingly. It is easier to keep a horse in good condition than to build him up after he has lost his strength.

When a blacksmith sticks in the same old run down shop year after year it's usually because he likes a Morris chair better than any other piece of machinery in the shop.

Smile—first, last, and all the time. Success didn't put the grin on that big man's face. The man put the smile there first of all and then the smile-habit brought the success.

Perhaps it's not too late to ask, "Have you taken that vacation yet?" Autumn is the finest time of the year for a real one. And don't forget to take along the wife and kiddies.

How do you charge for jobs handled with your oxy-acetylene plant? Others would be interested to know how you estimate charges for this class of work. Let's have a discussion on this point.

When you get to the point where you are planning to do the other fellow by cutting prices, just put yourself in the other fellow's place. It's better to get together and co-operate in the matter of prices.

Plow Work—have you any original ideas along this line? If you have and want to benefit brother readers, send in a brief description of how you handle various phases of this important branch of smithing.

Too busy to even do business! Can that be said about you, Mr. Blacksmith? Better take your business by the horns then and boss it, instead of letting it boss you. The ever-busy, fussy man never gets anywhere.

A wise guy wandered down the pike t'other day and looking into our shop muttered, "Under the spreading chestnut tree, the village smithy stands....." but before he got any further we added—"for no kidding!"

Keeping promises is a mutual affair. Promise a customer that you'll get that job done on a certain day. Then when it comes time to collect for that job, just remind him that you keep your promises—and get your pay.

More than ever these days we want to

save every penny possible. Why not take advantage of one of those long-time rate offers? Read the Honor Roll for this month and see what you can save—and then get busy and invest.

It's the little leaks that sink the big ship of business. Many a fine craft has been sunk through bad debts, lost charges, stolen goods, and the like. If you're a good captain, better keep your weather eye peeled for these things.

Sixty years or more at the anvil may mean much or little. It depends upon how much a man has devoted to a study of his craft. Application of scientific methods, gleaned from the best text books and trade journals, will do more for a man in a few years than a life-time of practice alone.

"Opportunity knocks but once" 'tis said. And it applies very well to the fellow who sits around waiting for trade to come to his door. The guy who meets opportunity face to face half a dozen times a day and shakes 'er by the hand every once in awhile, is he who hustles out and digs.

It's often the little things that count most. And it's the little item about this job or that one that may mean so much to some toiling brother who reads about it. It's just what he needs to save him from failure or loss in handling the same kind of a job. So next time you run up against a tough job, write up a little item about it and send it in to the editor.

It's a mistake to suppose that the oxy-acetylene process, the automobile and the power hammer spell the end of the smithing business. Nonsense, they mean the beginning of a bigger, better craft in every respect. They represent simply a stage in its advancement. They spell opportunity and success. And he is the wise smith who investigates without delay.

Keep up with the season. That's a good maxim to tack up in your shop where you'll see it every once in awhile. When shoeing's the thing, push it for all it's worth—if you have to hire extra help. When it's time for repainting automobiles, carriages and the like, go to it with all your ability and get the business. In season a big little secret of the success of many a live wire.

Unless your books are accurate barometers of your business you might better save the time you are wasting on them. Figures in books won't keep a business out of bankruptcy court. The real reason for keeping book records of a business is to show you just exactly where the business stands in a business way. Don't try to jolly yourself into thinking that you are doing a profitable business by juggling the figures in your business books.

Now! Today is the time to get after the toiling son of the soil and get him to settle. Don't let the money he owes you go into any more automobile equipment without a protest. Get busy and collect. The way to make collections good is to make them good, and right now is the best time to make them good. You can't do it by sitting in the shop and thinking about it. Your farmer customers have got the money now or should have it. You cannot get what belongs to you unless you go after it.



Our Honor Roll

AS GOOD AS A BOND!

That's what one reader says about his long-time subscription. It is an investment that pays for itself over and over again. Interest is paid monthly—and at a liberal rate—for every issue of "Our Journal" that is read by you adds just so much to your stock of craft knowledge. One could not ask for better security for his money. The "Blacksmith" is no new thing; it is an established craft institution. Then the conversion privilege is a feature worth considering. If you die before your subscription has expired, your family receives the balance due you at your death.

A long-time subscription is an investment well worth your thoughtful attention. Read the rates below. Notice how much actual cash you can save—and get busy today.

ANOTHER CHAMP FROM THE WEST!

We've got to hand it to those Wild and Woolly Western Iron Wallpapers for a real showing in the ring. First it's Utah, then Kansas, and now comes Minnesota with a husky son o' toll in the shape of Mr. H. E. Pass.

"Pears like he just had to 'pass' everybody on the 'Honor Roll' and here he is with a long-term sub paid up to Christmas, 1911!"

It's interesting to note that four of the new names on the "Honor Roll" for October are of subscribers in far-away Australia. And another is from Alaska.

U. S. and Mexico		Canada		Other Countries	
2 yrs.	\$1.60 and save \$.40	\$2.00 and save \$.50	10 sh. save 2 sh.		
3 yrs.	2.00 and save 1.00	2.70 and save 1.05	14 sh. save 4 sh.		
4 yrs.	2.50 and save 1.50	3.20 and save 1.80	18 sh. save 6 sh.		
5 yrs.	3.00 and save 2.00	3.75 and save 2.50	1 £ save 10 sh.		
10 yrs.	5.00 and save .500	7.00 and save .550	1 £ 14 sh. save 1 £ 6 sh.		

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving, the more you save. There is no better time than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
H. E. Pass, Minn.	Dec., 1941	H. Jones, England	Dec., 1925
M. A. Krehbiel, Kans.	May, 1937	A. J. Wassmuth, Idaho	Nov., 1925
The Fix-It Shop, Utah	July, 1935	J. G. H. Mallett, Queens, Australia	Nov., 1925
J. A. Torrey, Mass.	Dec., 1933	A. W. Speir, Ohio	Nov., 1925
W. C. Watt, Kansas	Dec., 1930	A. R. Clepper, Texas	Nov., 1925
I. J. Stites, N. Y.	Jan., 1929	G. H. Isley, Mass.	Nov., 1925
A. J. Brookman & Co., Aust.	Sept., 1928	L. Krause, Ind.	Oct., 1925
Waddington Farm, W. Va.	Mar., 1928	Reynolds Brothers, Pa.	Sept., 1925
A. MacLean Ont., Can.	Feb., 1928	F. W. Krens, Calif.	Aug., 1925
Plateau Shoeing Shop, Colo.	Dec., 1927	A. E. Allen, Nebr.	Aug., 1925
F. C. Bock, Nebr.	Aug., 1927	C. E. Spangberg, Oregon	May, 1925
W. W. Egly, Pa.	June, 1927	D. M. Kile, Okla.	Apr., 1925
C. Stebbins, Jr., Kansas	May, 1927	G. Gullgren, Iowa	Apr., 1925
J. Breneman, Va.	May, 1927	G. Fredericks, Minn.	Mar., 1925
S. Forman, N. J.	Apr., 1927	V. Priessnitz, Wisc.	Mar., 1925
H. Dyresen, S. D.	Apr., 1927	E. Price, Illinois	Feb., 1925
G. Shoemaker, Pa.	Mar., 1927	D. C. Garber, Ohio	Feb., 1925
C. Geiger, Penn.	Mar., 1927	J. H. Kurk, Illinois	Feb., 1925
F. Evans, Conn.	Mar., 1927	E. R. Hiteshue, Ohio	Feb., 1925
P. Flanagan, Cal.	Mar., 1927	H. F. Schreiber, Pa.	Feb., 1925
J. Peterson, Iowa	Mar., 1927	J. S. Damm, Iowa	Jan., 1925
A. Tillman, Calif.	Feb., 1927	J. M. Withers, Hawaii	Jan., 1925
J. W. Haight, Ill.	Feb., 1927	D. Teeblen, Nebr.	Dec., 1924
F. Roschy, Pa.	Feb., 1927	N. B. Quirk, Pa.	Dec., 1924
J. W. Howes, Md.	Feb., 1927	F. H. Jarvis, Indiana	Dec., 1924
W. Stocker, Texas	Feb., 1927	George Tatum, Jr., Fla.	Dec., 1924
W. Pontius, Iowa	Feb., 1927	I. Clark, Va.	Dec., 1924
M. Goller, Pa.	Feb., 1927	A. N. Estes, Va.	Dec., 1924
A. A. McLean, Nev.	Feb., 1927	J. Bailey, Manitoba	Dec., 1924
C. M. Adams, Conn.	Jan., 1927	E. G. Naylor, Md.	Dec., 1924
C. Radeleff, Iowa	Jan., 1927	Halvorson Brothers, S. D.	Nov., 1924
P. J. Kauth, Ill.	Dec., 1926	P. Schicks, Washington	Nov., 1924
A. H. Gooding, S. Aust.	Dec., 1926	H. E. Snyder, Oregon	Nov., 1924
H. Pass, Minn.	Dec., 1926	J. A. Stewart, Ky.	Oct., 1924
A. Grassdam, Ill.	Dec., 1926	C. Richenecker, N. Y.	Oct., 1924
C. J. Hale, Wash.	Dec., 1926	W. L. Bertholf, N. J.	Oct., 1924
John H. Schneider, Cal.	Dec., 1926	J. W. Hewson, S. Africa	Sept., 1924
J. C. Smith, Washington	Dec., 1926	Ed. Larson, N. D.	Sept., 1924
H. Grimm, Utah	Dec., 1926	R. T. Monk, Illinois	Sept., 1924
F. Harding, Iowa	December, 1926	W. T. De Young, Illinois	Sept., 1924
F. L. Mattocks, Ark.	Sept., 1926	C. W. Taylor, Pa.	Aug., 1924
E. B. Jones, Wisc.	Sept., 1926	Charles Wells, Colorado	Aug., 1924
J. Taylor, Calif.	Oct., 1926	H. G. Weaver, Pa.	Aug., 1924
W. H. Branch, N. C.	Oct., 1926	Working Men's College, Viet.	June, 1924
J. Clarke, Jr., Queens, Aust.	Aug., 1926	F. M. Kenoyer, Nebr.	June, 1924
I. Boies, Ohio	July, 1926	O. Anderson, Ariz.	May, 1924
J. A. Buchner, Mich.	July, 1926	R. C. Frederick, N. D.	May, 1924
H. Mitchell, N. Y.	July, 1926	H. L. Fenton, New Mexico	May, 1924
M. Broton, N. D.	June, 1926	J. Carl, Iowa	May, 1924
A. Schmitt, Nebr.	June, 1926	J. E. Little, Pa.	May, 1924
D. Ackland & Son, Man.	May, 1926	H. I. Brenale, N. Y.	Apr., 1924
H. Pirret, Ore.	May, 1926	W. E. Parr, Iowa	Apr., 1924
J. Sinclair, W. Australia	May, 1926	F. Sramek, Nebr.	Apr., 1924
P. Sowa, Oregon	May, 1926	L. A. Hulen, Calif.	Apr., 1924
E. P. Dignan, S. Aus.	Apr., 1926	J. E. Ray, Minn.	Mar., 1924
P. A. Peterson, Iowa	Apr., 1926	A. Hulstrand, N. D.	Mar., 1924
G. F. Bowers, Okla.	Apr., 1926	W. F. Riske, Wisc.	Mar., 1924
W. Pochela, Oregon	Mar., 1926	P. F. Seibert, Calif.	Mar., 1924
A. Garver, Ohio	Feb., 1926	H. Roeschewetter, Mo.	Mar., 1924
C. Burton, Mass.	Mar., 1926	W. B. Briant, N. J.	Mar., 1924
J. Murphy, Calif.	Jan., 1926	A. Bosch, N. Y.	Mar., 1924
J. F. Murphy, Nev.	Jan., 1926	D. Van Valkenburg, Mass.	Feb., 1924
F. Kearnes, Illinois	Jan., 1926	A. E. Johnson, R. I.	Feb., 1924
J. N. McIntire, Pa.	Jan., 1926	F. Jacobs, Ohio	Feb., 1924
W. Post, N. Y.	Jan., 1926	A. J. Ferry, Illinois	Jan., 1924
Powell Brothers & Whitaker, Eng-land	Jan., 1926	E. K. Walker, Calif.	Jan., 1924
Ø. Temple, Idaho	Jan., 1926	H. D. Erskine, Vermont	Jan., 1924
N. Karolewicz, S. Dak.	Jan., 1926	E. Fowler, Pa.	Jan., 1924
E. L. Lain, N. Y.	Dec., 1925	Breen & Son, Ireland	Dec., 1923
J. A. Hulvey, Illinois	Dec., 1925	M. Lamoreaux, Ohio	Dec., 1923
Williams & Turner, W. Va.	Dec., 1925	C. R. Davis, N. Y.	Dec., 1923
J. J. Devine, N. J.	Dec., 1925	F. W. Copeland, Kansas	Dec., 1923
P. Nelson, Minn.	Dec., 1925	J. L. Tomlin, Kansas	Dec., 1923
M. Kennedy, Tas., Australia	Dec., 1925	H. A. Davis, N. Y.	Dec., 1923

NAME	Subscription Paid to	NAME	Subscription Paid to
E. H. Troyke, Illinois	Dec., 1923	J. Robertson, Scot.	Dec., 1921
D. B. Johnson, Iowa	Dec., 1923	J. Lauer, Mo.	Dec., 1921
J. M. Karrer, Ohio	February, 1923	A. Brause, Ohio	Dec., 1921
S. Horton, Calif.	Nov., 1923	B. A. Abbey, Ohio	Dec., 1921
J. Spratt, Mass.	Nov., 1923	J. Ingvarson, Minn.	Dec., 1921
F. Watkins, N. H.	Nov., 1923	A. F. Millebrandt, Mich.	Dec., 1921
F. Koppala, Ala.	Nov., 1923	J. H. Teufel, Jr., Illinois	Dec., 1921
Y. C. Lienert, S. Australia	Oct., 1923	R. C. Brown, Mo.	Dec., 1921
W. B. Abell, N. Y.	Oct., 1923	C. Beyer, N. D.	Dec., 1921
A. J. Brookman & Co., Viet.	Oct., 1923	G. Nichols, Okla.	Dec., 1921
Australia	Sept., 1923	F. H. Joslin, Mass.	Dec., 1921
W. R. Turner, Man.	Oct., 1923	J. B. Scheldier, Indiana	Dec., 1921
C. Nelson, Nebr.	Sept., 1923	J. H. Ickes, Pa.	Dec., 1921
J. Hughes, Ohio	Aug., 1923	E. Willis, Colorado	Dec., 1921
H. M. Anderturen, Calif.	Aug., 1923	A. Elliott, England	Nov., 1921
Camp Brothers, Texas	Aug., 1923	J. Beam, N. J.	Nov., 1921
L. C. Larson, Iowa	July, 1923	F. Kolarik, Iowa	Nov., 1921
S. Effenaar, South Africa	July, 1923	A. McNab, Scotland	Nov., 1921
G. L. DeWitt, Mont.	July, 1923	J. Delane, Nebr.	Nov., 1921
W. W. Gregg, Texas	July, 1923	A. Marks, N. S. W., Aust.	Nov., 1921
W. R. Stroupe, N. C.	July, 1923	O. R. Stevenson, Ill.	Nov., 1921
O. C. Young, Michigan	June, 1923	J. Meier, Minn.	Nov., 1921
Otto Sippel, Pa.	June, 1923	J. O. Altkin, Aust.	Oct., 1921
A. Chapman, N. Y.	June, 1923	W. Knouff, Ala.	Oct., 1921
C. Birely, Md.	June, 1923	O. M. Johnson, Miss.	Oct., 1921
F. H. Shupe, Pa.	June, 1923	J. K. Glinicki, Mich.	Sept., 1921
J. C. Stover, Pa.	Apr., 1923	H. Feldus, Nebr.	Sept., 1921
W. Schoonover, Pa.	Apr., 1923	R. Murray, Calif.	Sept., 1921
L. M. Rumler, Iowa	May, 1923	A. Hammond, Calif.	Sept., 1921
Lowndale Brothers, Mo.	Mar., 1923	P. Wedel, Kans.	Sept., 1921
J. Carswell, Ark.	Mar., 1923	J. Ackerman, Indiana	Sept., 1921
G. E. Glazier, Ohio	Mar., 1923	A. Harper, Mont.	Aug., 1921
F. Gath & Co., S. Africa	Mar., 1923	L. E. Bonton	Aug., 1921
T. Bradley, N. S. Wales	Mar., 1923	C. Pearce, Australia	July, 1921
L. T. Needham, Illinois	Feb., 1923	J. Watson, S. Africa	July, 1921
G. C. Disinger, Miss.	Feb., 1923	R. Goldschagg, S. Africa	July, 1921
J. Wieber, Minn.	Jan., 1923	C. Hammerstram, Minn.	July, 1921
Z. A. Enos, Minn.	Jan., 1923	A. S. Pratt, New York	July, 1921
W. G. Wise, Calif.	Jan., 1923	E. H. Spain, Ariz.	July, 1921
F. S. Bishop, South Africa	Jan., 1923	L. H. Strange, Viet.	July, 1921
J. Curran, Arizona	Jan., 1923	W. Urquhart, New Zealand	June, 1921
S. P. Harney, Mont.	Dec., 1922	V. Voigt, S. Africa	June, 1921
W. Breckner, Okla.	Dec., 1922	J. M. Werl, Pa.	June, 1921
J. Pabina, Nebr.	Dec., 1922	E. Toll, New Zeal.	June, 1921
P. Fredericksen, Iowa	Nov., 1922	G. Johnson, Kans.	May, 1921
L. O. Leulirs, Illinois	Nov., 1922	S. Budds, New Guinea	May, 1921
W. Lawson, New Zealand	Nov., 1922	H. Baker, Australia	May, 1921
W. O. Grant, Calif.	Oct., 1922	F. E. Smith, Vermont	May, 1921
W. H. Miller, Iowa	Oct., 1922	A. J. Hatch, Maine	May, 1921
J. S. Lee, Wash.	Sept., 1922	W. Cornwell, Pa.	May, 1921
A. O. Martin, Idaho	Sept., 1922	W. F. Kline, Kansas	May, 1921
O. A. Mortimer, Idaho	Sept., 1922	J. Kirkbride, N. J.	May, 1921
H. J. Hyatt, Washington	Sept., 1922	Thos. McNeill, Scot.	May, 1921
J. N. Skow, Iowa	Sept., 1922	T. Holloway, Kans.	Apr., 1921
A. D. Standiford, Washington	Sept., 1922	W. Winget, Vt.	Apr., 1921
T. Temkiewicz, Quebec	Sept., 1922	J. A. Johnson, N. D.	Apr., 1921
A. Pellifer, Ohio	Aug., 1922	D. H. Laird, N. Y.	Apr., 1921
W. D. Valentine, Iowa	Aug., 1922	A. J. Prue, N. Y.	Apr., 1921
E. T. Cull, Ky.	July, 1922	C. A. Butler, Ohio	Apr., 1921
G. Hoffman, N. Y.	July, 1922	E. Mossner, Queens, Australia	Apr., 1921
J. Erman, Ark.	July, 1922	J. Laux, Oklahoma	April, 1921
W. B. Gelling, Australia	June, 1922	C. L. Cesse, Pa.	Mar., 1921
W. K. W. Hansen, Pa.	June, 1922	E. Lindblad, Nebr.	Mar., 1921
Robert Tochter, Calif.	June, 1922	F. Bowen, N. Y.	March, 1921
J. Van Marter, N. Y.	June, 1922	W. F. Tippey, Mich.	Mar., 1921
J. T. Brahm, Iowa	June, 1922	J. T. Rehm & Son, N. Y.	Mar., 1921
A. Olson, Minnesota	June, 1922	W. C. LeBow, Mo.	Mar., 1921
Otho Altman, Mich.	June, 1922	William Tate, Mo.	Mar., 1921
E. Schnelle, Ohio	Apr., 1922	A. T. Jameson, Colorado	Mar., 1921
J. Bunker, Iowa	Jan., 1922	C. Alexander, N. Y.	Mar., 1921
F. Norrie, Yukon Ty.	Jan., 1922	J. Fenel, Wisc.	Mar., 1921
J. Needham, Kans.	May, 1922	H. Cornils, Oregon	Mar., 1921
E. Anders & Son, S. Aus.	May, 1922	C. Schmid, Nebr.	Mar., 1921
Louisa Carriage Works, Va.	May, 1922	J. Schwarzmann, D. C.	Mar., 1921
S. Wilkin & Sons, N. Y.	Apr., 1922	M. Stettner, Minn.	Mar., 1921
R. H. Kuhn, Iowa	Apr., 1922	Elmer Wetzel, N. J.	Feb., 1921
S. Smith, Texas	Apr., 1922	J. Potthoff, Nebr.	Feb., 1921
E. Burrows, Eng.	Apr., 1922	N. E. Hart, Okla.	Feb., 1921
A. J. Neill, Vt.	Mar., 1922	C. Knudson, Iowa	Feb., 1921
W. Muckle, Ontario	Mar., 1922	S. Button, Kans.	Feb., 1921
M. Burke, Ariz.	Mar., 1922	N. F. Hartsoe, Mo.	Feb., 1921
J. W. Hodge, N. Y.	Mar., 1922	I. Qoeprle, N. Y.	Feb., 1921
J. W. Haar, La.	Mar., 1922	B. E. Worthington, N. Y.	Feb., 1921
D. W. Smith, Rhode Island	Mar., 1922	B. E. Doggett, Kansas	Feb., 1921
E. A. Dillon, Nev.	Mar., 1922	Shellhaas & Fry, Colorado	Feb., 1921
D. F. Kuster, Washington	Mar., 1922	J. Tooes, Kansas	Feb., 1921
C. A. Whitacre, Ohio	March, 1922	J. W. Wilson, Mo.	Feb., 1921
J. Poettgen & Co., Missouri	March, 1922	W. T. Wilson, Indiana	Feb., 1921
W. T. Long, Colo.	Feb., 1922	J. Schmid, Nebr.	Feb., 1921
C. Robertson, South Africa	Feb., 1922	E. Sies, New York	Feb., 1921
J. Zavadnik, Kans.	Feb., 1922	A. R. Skeritt, New York	Feb., 1921
P. C. Oldroyd, Utah	Feb., 1922	W. H. Starkey, Kans.	Feb., 1921
V. Vanouret, Wisc.	Feb., 1922	W. Singleton, Pa.	Feb., 1921
W. Parker, Mich.	Feb., 1922	E. N. English, Iowa	Jan., 1921
J. DeGlopper, Mich.	Feb., 1922	H. Becker, Ill.	Jan., 1921
Nordstrom Bros., Kans.	Feb., 1922	G. Ties, N. J.	Jan., 1921
G. F. Johnson, Michigan	Feb., 1922	J. Briere, Vt.	Jan., 1921
J. Schoenberger, Ohio	Jan., 1922	A. Bartlett, Mo.	Jan., 1921
A. Burgett, Pa.	Jan., 1922	E. H. Manley, Vt.	Jan., 1921
R. H. Keith, Iowa	Jan., 1922	Neufeld & Giesbrecht, Kans.	Jan., 1921
W. Parks, Ohio	Jan., 1922	W. C. Abbott, Ohio	Jan., 1921
O. Dannemann, Minn.	Jan., 1922	Feldmeyer & Schaake, Mo.	Jan., 1921
O. Stenning, S. D.	Jan., 1922	A. Josepott, Colorado	Jan., 1921
W. Claffey, Illinois	January, 1922	C. L. McNall, Mo.	Jan., 1921
J. Williams, Australia	Dec., 1921	A. Turley, Kansas	Jan., 1921
C. Beggs, Alaska	Dec., 1921	A. Seidel, Nebr.	Jan., 1921
J. J. Klima, Nebr.	Dec., 1921	W. Ruple, Pa.	Jan., 1921
J. Boyer, Mich.	Dec., 1921	N. A. Englund, Iowa	Jan., 1921
C. F. Shaw, Man., Can.	Dec., 1921	O. Gerhardtstein, Ohio	Jan., 1921
W. Bisker, Ohio	Dec., 1921	W. C. Rutter, Illinois	Jan., 1921
W. Lamberton, N. Y.	Dec., 1921	J. L. Jester, Mo.	Jan., 1921
Scheffey & Schmitt, Pa.	Dec., 1921	G. A. Moffatt, Yukon Ty.	Jan., 1921
O. Furry, Kans.	Dec., 1921	F. Fisher, S. D.	Jan., 1921
E. A. Pierson, Okla.	Dec., 1921	J. H. Winn, Iowa	January, 1121



The Machine and Tool Smith

Forging A Connecting Rod

WILLIAM H. OST

The connecting rod as shown in Fig. 1 is a type commonly used on logging and hoisting engines. When more than one is to be made, it is best to forge them in pairs as shown in Fig. 2.

Stock 4" x 5" and of sufficient length to forge two rods may be used and then cut in the center as shown at (x) Fig. 2. The stock of 4" x 5" is fullered on both sides at intervals of 13½" except at (x) which is the length of two ends. The distance between the fullered sections is obtained by estimating the cubic volume of the finished rod between points x and y, Fig. 1 (c) (13⅝" x 4' 6" x 3½") and dividing this by the cubic volume of the large end (4" x 5" x 1").

Thus $1\frac{3}{8} \times 3\frac{1}{2} \times 54 = 2079$ cu. in.

$4 \times 5 = 20$

$2079 \text{ cu. in.} \div 20 \text{ cu. in.} = 103.95$ approximately

A small extra allowance is made for loss in drawing. There are three widths of the rod 3½", 4", 3", Fig. 1 (c). The average diam-

eter is first obtained, ———— 3½" plus 4" plus 3" divided by 3" equals 3½".

The Lap Ring

WM. K. BELL

Just a common lap ring. Every blacksmith knows how to shape one and can probably recall with a good deal of amusement his own or some one else's first attempt at the job.

However, there may be one among the many readers of THE AMERICAN BLACKSMITH who fails to get it just right—every time. For his benefit the following is offered. It may not be the best method, but the writer can assure him it is not the worst.

Cut iron to length as for chain link plus enough for laps. Heat, flatten, and turn one end as at A, in Fig. 1. Heat, flatten, and turn the other end as at B. Then heat and bend at center as at C.

The foregoing is the reverse of the procedure followed in shaping a chain link which is first heated and turned at center as at A in Fig. 2. Both ends are then scarfed and turned at one heat as at B. Very simple and easily done. This brings to mind a little incident that occurred quite a good many years ago that I still remembered with some amusement: A customer who was a well driller came into the shop in a hurry for a lap ring of ¾ iron. Being busy and knowing he had a forge with which he did more or less of his own repair work I told him to go to a vacant forge in the shop and make his own lap ring. That would be one job at least where he would have no kick coming on high-priced work and it might be that he would show others how to speed up a little. All right, thank you. Yes, he would make it, easy enough done. At the

end of thirty or forty minutes he gave up in disgust and while he did not make a lap ring it is only fair to say that during the time he did make pretty near everything else that could be shaped out of iron. A ring was formed for him as described and as he walked out of the shop he hollered over his shoulder, "Oh!

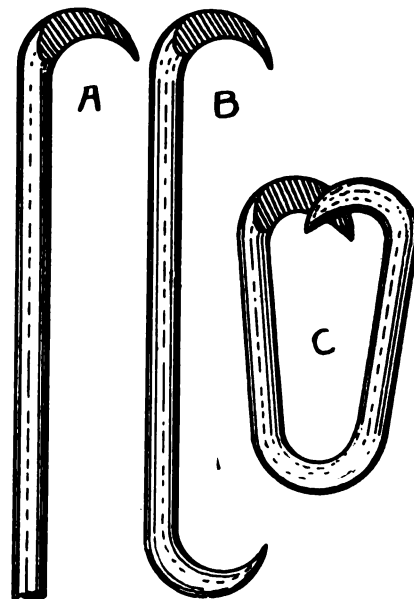


FIG. 1.—STEPS IN FORGING A LAP RING

yes, simple little thing, easy done; any one can make a lap ring, if he knows how!" which is the truth. "If" is a little word—so are lap rings little things—but——— !

When a Railroad Is Liable for Delay in Getting Goods to Their Destination

ELTON J. BUCKLEY

With everybody complaining because of delays in shipping goods, it may be interesting and useful to say something about when you can hold a railroad liable for delay in getting goods to you. Read this letter.

Phillipsburg, N. J.

Elton J. Buckley, Esq.

Dear Sir:—On April 18, 1917, I bought a shipment of green goods from a firm in Philadelphia, and it didn't arrive here until April 23d, making a delay of five days. Before receiving the goods I insisted that the freight bill be marked "five days in transit and in bad condition." Then after securing the waybill, which was marked Philadelphia & Reading Railway Co., and after having my bill sworn to by a notary public, I then made a claim to the Central Railroad Co., as the freight bill was made out to that company.

I have just received the following letter from the claim agent:—

Having further referred to your claim of May 1st, covering alleged damage to

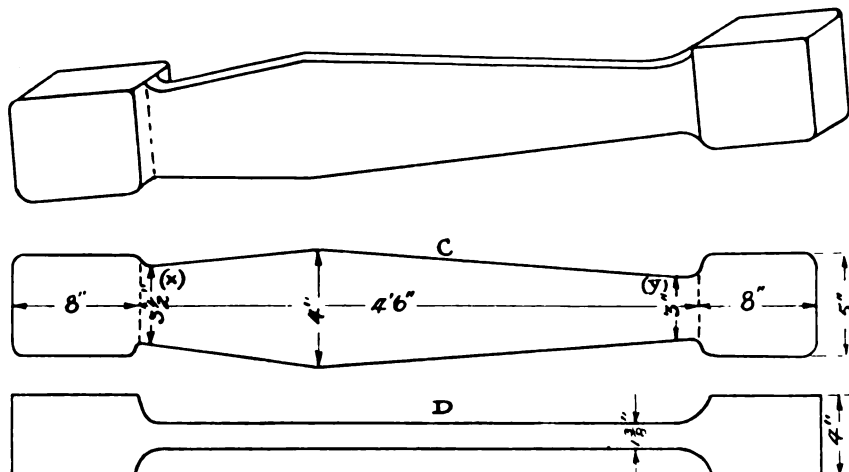


FIG. 1.—FORGING A CONNECTING ROD



shipment of pineapples, etc., advise that we have investigated the handling of this shipment while in the possession of the carriers and we find that there was a delay at Easton Transfer, due to congestion over which the carriers have no control. Therefore we will be obliged to disallow your claim, and we are returning your bill invoice and original bill of lading and must ask you that you allow our records to remain closed.

W. H. Druse,
Freight Claim Agent.

As our waybill was marked Phillipsburg, N. J., we do not see why we should be responsible for the delay in Easton, Pa.

Please give us your advice on this matter. Would it be advisable to sue the Central Railroad Co.? We do not want to lose the damages, so would like to know the best course to pursue. I remain,
Yours truly,

Adam Martin.

This is somewhat of a typical case. Perishable goods are delayed in shipment and deteriorate en route. Result: a loss directly due to the delay. Who is responsible?

Naturally a railroad company protects itself in every way it can in its bill of lading. Touching the question of delay, practically all bills of lading contain the following:—

No carrier or party in possession of any of the property herein described shall be liable for any loss thereof or damage thereto or delay caused by the act of God, the public enemy, quarantine, the authority of law, or the act or default of the shipper or owner, or for differences in the weights of grain, seed, or other commodities caused by natural shrinkage or discrepancies in elevator weights. For loss, damage, or delay caused by fire occurring after forty-eight hours (exclusive of legal holidays) after notice of the arrival of the property at destination or at port of export (if intended for export) has been duly sent or given, the carrier's liability shall be that of warehouseman only. Except in case of negligence of the carrier or party in possession (and the burden to prove freedom from such negligence shall be on the carrier or party in possession), the carrier or party in possession shall not be liable for loss, damage, or delay occurring while the property is stopped and held in transit upon request of the shipper, owner, or party entitled to make such request; or resulting from a defect or vice in the property or from riots or strikes. When in accordance with general custom, on account of the nature of the property, or when at the request of the shipper the property is transported in open cars, the carrier or party in possession (except in case of loss or damage by fire, in which case the liability shall be the same as though the property had been carried in closed cars) shall be liable for negligence, and the burden to prove freedom from such negligence shall be on the carrier or party in possession.

No carrier shall be liable for loss, damage, or injury not occurring on its own road or its portion of the through route, nor after said property has been delivered to the next carrier, except as such liability is or may be imposed by law, but nothing contained in this bill of lading, shall be deemed to exempt the initial carrier from any such liability so imposed.

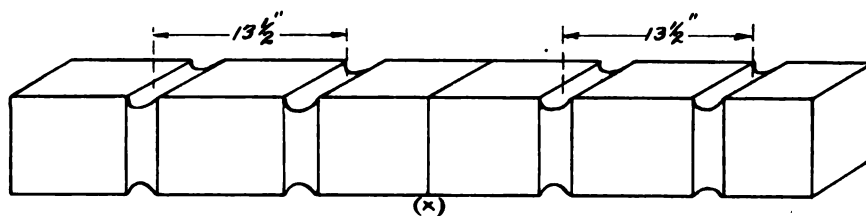


FIG. 2.—FORGING A CONNECTING ROD

In addition to these provisions in the bill of lading, and in spite of them, a railroad that forwards goods, if there is no contract requiring delivery within a certain period, is held liable by the settled law, to make shipment within a "reasonable time" under the circumstances of the case.

The following is from a leading case:—

In the absence of a special contract binding the carrier to deliver within a specified time, mere delay in transportation does not create any liability on a railroad to respond in damages. The carrier is bound to use reasonable diligence and care and only negligence will make it liable, without a specified time in the contract. The shipper assumes the risk of unavoidable accidents and of usual and ordinary delays incident to the ordinary conduct of the carrier's business. Nevertheless, if

2.—The delay was caused by an act of God, such as the train being struck by lightning.

3.—The delay was caused by freight congestion due to weather conditions.

4.—There was an unexpected rush of business which tied us up.

5.—The delay was caused by strikes or mobs.

6.—The delay was caused by unavoidable accident.

7.—The delay was caused by some other cause entirely beyond our control.

If the railroad can prove any of these it is not liable, no matter how great the delay was, or how large the loss.

But if the delay was caused by any of the following conditions, the railroad is not excused: When the delay is due to a wreck caused by the railroad's own negligence; or when goods are carried past their destination, causing delay; or when the road has accepted goods for shipment, knowing it could not ship within the time; or when it refuses to place a car in position to be unloaded quickly; or when it unloads an engine or uses one that it knows is defective; or in case of perishable goods, where it fails to get them to market, when it could do so by transferring them to another train.

Many factors influence the question of what is a reasonable time. The character of the goods influences it—a reasonable time for perishable goods is shorter than for a reasonable time for iron, or hardware or dry goods. The special conditions set forth above—weather, rush of business, etc., influence it and increase the "reasonable time" over what it would be in normal times.

Of course, even where the delay came from one of the causes that would ordinarily exonerate a railroad from blame, the road may still be liable—if it knew when it accepted the shipment that a condition existed which would cause delay, and did not tell the shipper.

Another thing—if there is a delay, whether it is the railroad's

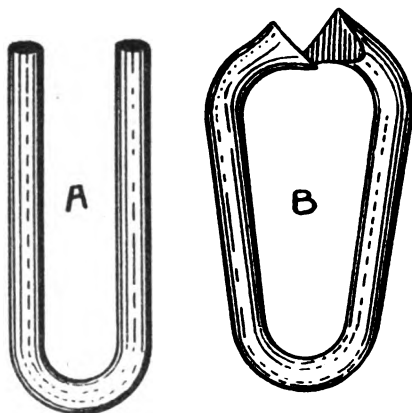


FIG. 2.—SHAPING A CHAIN LINK

damage results from failure, without good cause to deliver the goods at their destination, within a reasonable time, the carrier is liable for such damage. The law declares that the goods must be delivered within reasonable time.

Deciding what is a reasonable time is not particularly difficult in the average case, for the court simply takes proof of the time it usually takes. If it has taken longer than usual in the particular case, and the shipper or receiver has lost by it, it is up to the railroad to tell why it took longer.

There are several good excuses which the railroad can offer, all of which will absolve it from liability. For instance, any of the following:—

1.—We hadn't enough facilities.

fault or not, it is the railroad's duty to protect the goods en route in every way it can. Under the cases this means taking the highest care possible under the circumstances.

The shipper must show that his goods took longer than usual, and that the railroad's negligence was responsible for that. If the delay was caused by something wholly beyond the railroad's control, it is not liable.

Of course, if the railroad has made a special contract to deliver within a certain time, nothing whatever will excuse its failure, not even an act of God.

How Many Pounds in an Ounce?

That's what one Irishman asked another, and Mike perplexedly replied, "Shure, an does th' likes of yez think Oim a magician. For what th' the devil would there be a pound in an ounce for, tell me thot, or go 'long wid your blarney!"

At first reading of such a statement, it does seem a bit improbable. Yet we all know that every ounce has a pound equivalent and every pound an ounce equivalent, even though it is reckoned in fractional units.

The way to find the corresponding values of a pound in ounce values is by dividing. For instance, if we want to find out how many pounds there are in three ounces, we naturally divide 3 by 16 and get as a result 0.187 pounds. But dividing by "hand" is for most of us a tedious and irksome task. So we have invented this handy little chart to take care of such division as would ordinarily be required in changing ounces to pounds and vice versa.

This is the way "it works": Suppose we want to find how many pound there are in 8 ounces. First we look for 8 in the ounce column. Then we simply glance immediately across to the pound column and here we see as clear as abc 0.5, which represents the number of pounds contained in eight ounces. In this case you can easily see that 0.5 pounds represents half a pound and is equivalent to 8 ounces, there being 16 ounces to every pound.

Reversing the operation, let us see how many ounces there are in say 0.65 pounds. By applying the same method of finding our known figures in one column and glancing across to the opposite column for the numbers wanted, we find the answer to be about 10.4 ounces. You have

1	0.07
	0.08
	0.09
	0.1
2	
3	0.2
4	
5	0.3
6	
	0.4
7	
	0.5
8	
	0.6
9	
10	0.7
	0.8
	0.9
15	1
20	1.5
	2
30	
	2.5
40	
	3
50	
	4
60	
	5
70	
	6
80	
90	
100	

to roughly estimate the fractional part of an ounce, but this can be done with reasonable accuracy; at least sufficient for all practical purposes.

—W. F. S.

A Mechanical Egg Preserver

L. R. SWARTZ

The advantage of this device is that no lime water, liquid glass, or other chemicals are required. The eggs are kept good by keeping the yolk and germ always centered in the egg; for this reason the eggs come out of the preserver without having been leached in any bath to discolor the shells.

Eggs have been kept one year in this device and were found to be in first class condition when taken out for use.

The device is easily built by any smith or wood worker.

The original patentee made and sold the 100-dozen size for \$7.50 each during the latter eighties.

This is another of the many perfectly good and feasible devices invented and patented from which it is doubtful whether the inventor ever received a sufficient return to repay the patent fees.

The device consists of a base, two uprights, two trunnions for carrying the container upon the two uprights, and the container, which is simply a box of sufficient dimensions to hold the desired number of eggs packed in fillers the same as are used in the crates commonly employed in shipping eggs.

At one end of the box, surrounding, or if desired, being a part of the base of the trunnion, is a timer that announces the fact that the box has been turned the proper distance. The original pattern had a six-toothed ratchet formed on the base of one trunnion. Against this ratchet rested a flat spring acting as a pawl which gave a snap when one tooth of the ratchet passed under it.

This arrangement serves very well if the container is packed so as to balance. Otherwise the container might be inclined to turn too far when the heavy side came over.

After the eggs have been put into the container, the box is given 1/6 of a complete revolution in a given direction each day.

As the yolk has a tendency to settle to the lower side of the egg this turning keeps it in a central position in the egg.



I have kept eggs in condition for hatching by packing them in an ordinary shoe box and turning the box

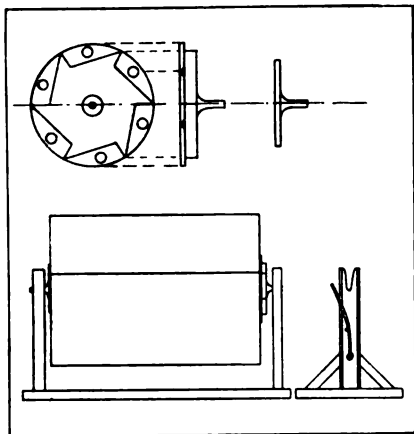


DIAGRAM OF THE MECHANICAL EGG PRESERVER DESCRIBED BY MR. SWARTZ. IN THE UPPER LEFT-HAND CORNER IS A RACHET TRUNNION; ON THE RIGHT A PLAIN TRUNNION. AN UPRIGHT WITH SPRING IS ALSO SHOWN.

1/4 turn a day, always in one direction.

From this it seems to me that it makes little difference whether the eggs received $1/4$, $1/5$ or $1/6$ turn, so long as they are turned in a given direction.

I would advise placing eggs so that the long axis of the egg is parallel with the axis of the container. That is the way I packed all the hatching eggs in shoe boxes, so as not to affect the air space at the large end of the egg.

Editor's Note: At this time when foods, especially eggs, are almost priceless, anything designed to conserve the supply is much worth while. Mr. Swartz offers this article to our readers with this comment: "The H. C. L. being a topic of interest these days, I will do my bit by giving plans for an "Egg Preserver." This is no fake contraption, but a machine that was given a year's test before patents were taken out. The patents have long since expired and were never renewed."

A Fourteenth Century Wrought Iron Pulpit

JOHN Y. DUNLOP

There are very few examples, at the present time, of Wrought Iron Pulpits of any artistic value in England, and in the church records there is no evidence of metal having at any time ever been a fashionable material for the construction of these raised ecclesiastical platforms. Early architecture in Britain seemed to be more concerned about the possibilities of their construction in wood,

with the result that wood pulpits have become very common and metal pulpits quite rare.

The beautiful example shown in the accompanying illustration was probably built during the early part of the Fourteenth Century, as the cathedral itself is of Norman origin.

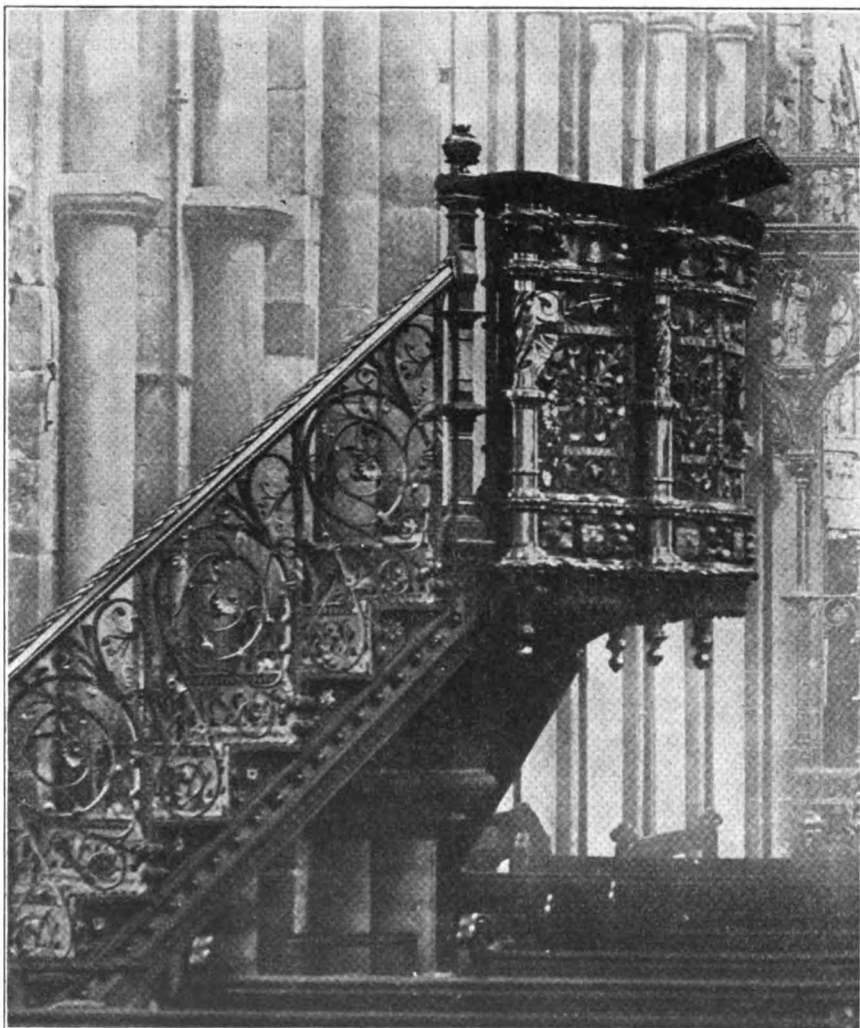
There is no record of the name of blacksmith who was entrusted with this intricate piece of work. The pulpit simply stands today as a splendid example of the typical workmanship of that mediaeval period.

The pulpit is arranged round one of the massive stone piers which forms the nave of the church and is built with steps on each side. There is no indication just why a double stair should have been built. Possibly it was entirely a matter of convenience; perhaps or a wish to give the pulpit a more complete and balanced appearance when viewed from either side.

There are eight steps on each flight and the construction of both are exactly alike. They consist of two

metal stringers which are anchored into the nave floor and connected to the pulpit at the top. These stringers are angle sections and from their appearance have evidently been made of a single piece of plate metal. The one adjoining the stone pier is quite plain, while the outer one is formed into a moulded section with a beaded ornament formed on one of the lower members along the whole length.

Higher up in the section of the stringer, spherical bosses have been formed at regular intervals. On the top of each of those stringers small spandril pieces are formed for the tread and rise of the step. On each side of the spandril the metal has been turned in to form an angle section so that it forms an easy support for the breast and step of the stair, while the angle section on the long side allows the support for the steps to be rivetted to the top edge of the stringer. The front of the steps and the tops are made from quarter inch metal plates.



THE BEAUTIFUL WROUGHT IRON PULPIT OF AN ANCIENT NORMAN CATHEDRAL IN ENGLAND



In section, the front is simple in form but it has been profusely pierced with simple Gothic openings, which often tell the period and style of the church furnishings.

The steps are formed with an up-turned piece at the back to which the front is fixed, while the front edge is turned down for a distance of one and a quarter inches and is finished with a leaf ornament along the nosing of the step.

A sketch showing the appearance of the end of the step is shown in the line drawing, together with one of the panels in the balustrade.

This part is also of wrought iron except the twisted ornament on the top of the handrail, which is made of brass.

The main balusters are fixed on every second riser so that these ornamental panels extend over two steps.

At the top of each stair the handrail is received by heavy balusters which have been executed in the true characteristic style of the Gothic period. These extend up to form the terminals of the pulpit front.

The pulpit is built on the cantilever principle, a wrought iron moulding having been made to fit the lines of the stone pier from which springs a series of plates which are circular in plan and curved in outline to support the floor of the structure.

These plates are highly ornamented on their exposed faces and are bolted to the shaped metal frame of the pulpit front.

The floor covering is of wood but

this is supported on a light metal frame which is fixed into the stone work.

In building the front of the pulpit a simple frame has been formed consisting of four vertical and level members each of which are of square sections while the top member is shaped to the outline of the floor framing.

To these the ornamental and moulded parts are all studded and screwed.

Apart from the mouldings and columns each panel of the pulpit front has been forged in three parts.

The frieze band is embossed with semi-spherical trefoils and helmet-like ornaments.

The open panel is scrolled and covered with leaf ornament, and the base part has been made up in much the same way as the frieze plate.

These have all been fitted in and screwed to the main framing of the pulpit.

The columns and mouldings are screwed on the front of the framing.

Of course, in examining these interesting relics of ornamental iron work which have come down to us, we are in a great measure reduced to conjecture as to the means employed to produce them.

Still, I think it is quite clear that they have not only been worked out from carefully prepared drawings, but, in cases where there are several pieces of precisely similar shape, matrices to form them must have been made beforehand. That is how such

great uniformity is found in the various detail.

The modern worker must adopt the same methods if he wishes to rival such worthy predecessors and produce, as they have done, such lasting examples of artistic wrought iron work as these artisans of a past age have left to heritage.

The Oxy-Acetylene Plant—7

Its Installation, Operation, and Torch

Manipulation

DAVID BAXTER

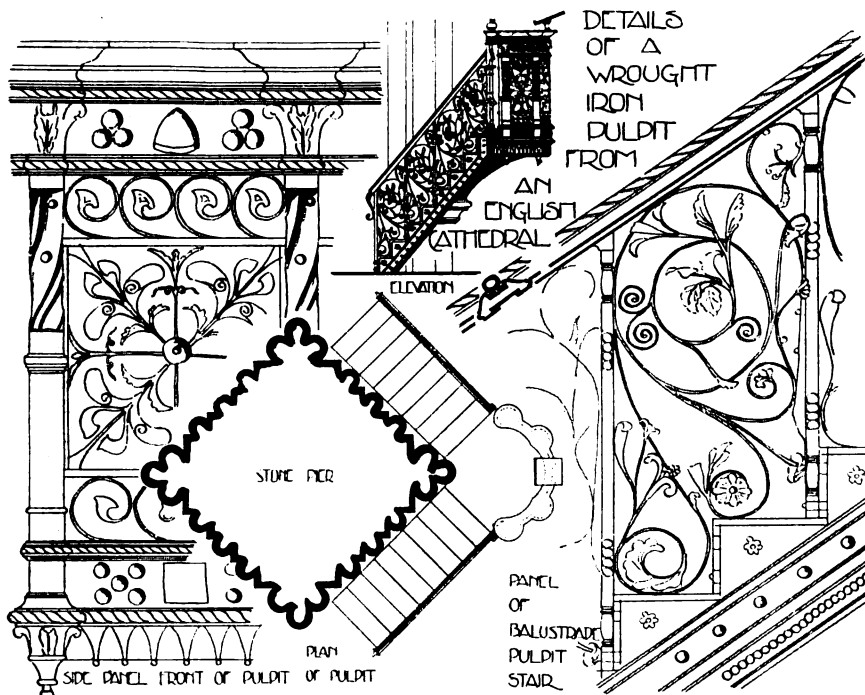
Fluxing

The use of flux does not mean that the weld is sure to be perfect. In fact, it quite often is the opposite, but usually this is not because flux is used, it may be the wrong flux for the purpose, or it may have been applied incorrectly. Flux is used when welding by oxy-acetylene, to prevent oxidation, remove scale and slag, and to make the melted metal more fluid. A little thought will convince us that if we use flux for a certain purpose, we cannot expect it to be a cure-all for ills.

In using flux to resist oxidation choose a material or compound which has an affinity for oxygen. Or in plainer words use something which will absorb oxygen before it can reach the melted part of the weld. Or, use a flux that will keep the air and especially the cold air, away from the melted weld. The brass foundrymen endeavor to keep the air away from the molten metal by keeping it covered with charcoal, or some other material. It is obvious, we cannot keep the weld covered with any thing like this, so we must find something that forms a gas or dead-air space around the melted weld. Some of the fluxes on the market burn with this effect.

Some flux burns with a yellow glare that is quite bothersome until one is accustomed to it. It seems one cannot work through it because he cannot see what he is doing. He feels as though he must brush or blow the stuff away, but he soon learns to work through it or between flashes. This he may do by working rapidly.

The common way to apply the de-oxidizing flux is to have an iron pot of it handy, where the filler-rod can be dipped into it. The heat causes particles of the flux to cling to the rod. The flux dipped out on the rod is placed upon the weld. It is better to use a small amount frequently as too much flux at a time only wastes it, for the pressure of the



DETAILS OF CONSTRUCTION OF THE PULPIT SHOWN ON PAGE 19



gases blows it away before it can be used.

A flux for removing scale, dirt etc., is put on the melted metal the mo-

if it shows clearly, a ring of white around the edge, it is still too hard for particular work. This white iron does not have any grains visible to

it is safer to use some kind of flux. The wise operator will study the structure and composition of his metals and fluxes, that he may be able to know them on sight, and may be able to judge by experience what is proper to do in each instance.

(To be Continued.)

A Blacksmith the First to Fly

In this day and age when we hear so much of the success of the aeroplane, how many know that it was a blacksmith who first attempted to fly in a heavier-than-air machine?

Way back in 1480, Leonardo da Vinci, the great artist, produced the World's first flying machine, but it was not until many decades had elapsed before anyone was game enough to give it a fair trial. Old Leonardo pattered around and didn't get off the earth until he died; but Besnier, the smith, a sturdy knight of hammer and forge said to himself along in 1678, "The birds can fly—so why can't I?" And he went right ahead and flew.

The villagers "kidded" him mercilessly as he talked, and worse when he started making his flying machine, but Besnier was determined.

His scheme was to place light boards on the ends of two long poles; to put the poles over his shoulder, to chain the rear end of the pole to his feet and then to launch himself into the air with a swimming motion, his arms and feet giving the wings an up and down motion that would shoot him aloft like a buzzard.

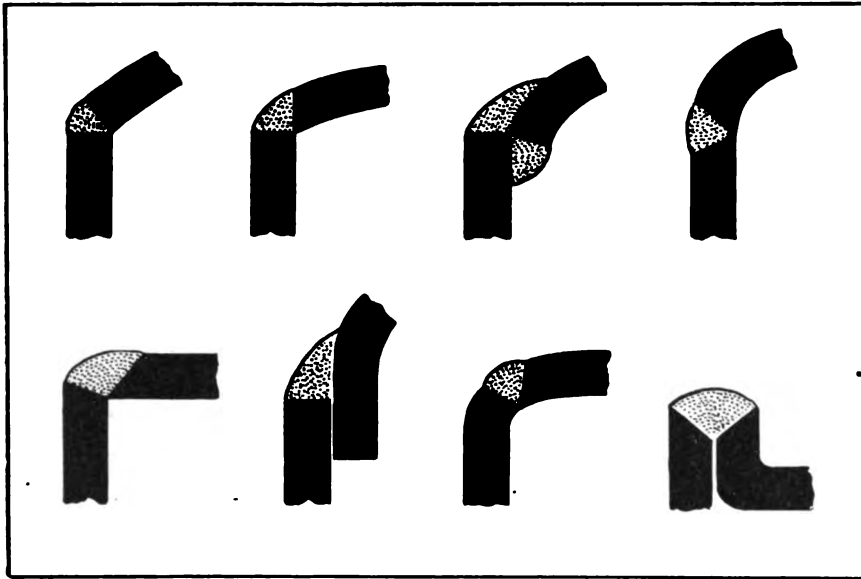
It was a fine scheme and one day when he was ready he invited all the neighbors in and led them to a hill. He put the poles on his shoulders, gave a "whoop" and leaped over the edge, working his hands and feet like a dog in the water. The women shrieked and the little boys cheered and the cows in the pasture belowed and ran—and Besnier, the smith, with a great flopping of wooden wings came thundering down to earth, broken and splintered and quite ready to don lighter and more feathery wings—the kind that accompany a harp and golden streets.



Benton's Recipe Book

Many Articles are Apparently Brass, but are actually iron or steel brass plated. The easiest way to determine the material inside the coating, is to touch the article with a magnet.

A Strong Glue to Resist Moisture—The following is a good method of making.



WELDS FOR TANK AND DRUM ENDS

ment the torch passes the spot. The flux will melt and float on the metal and may be blown away with the torch or scraped away, or skimmed off while metal is yet fluid. Some flux will burn up and blow away in form of ashes, taking scale with it.

Where the operator is unable, for any reason, to get a compound flux, he may use anyone of several home-made compounds with good effect, such as borax, salt, glass-sand, sal-ammoniac, or saltpeter.

With some metals, as certain kinds of cast iron, it is necessary to use flux made of, or containing, some material yielding oxygen *instead of absorbing it*. The office of this oxygen is to unite with any excess of carbon and silicon carried in the filling rod. This neutralizing of the carbon and silicon prevents to a great extent the carbonizing of the metal. This carbonizing is one of the greatest obstacles the torch operator has to overcome. He may weld a casting in ever so good a manner, only to find it is worthless on account of being so hard and brittle that it cannot be machined.

In most cases this hardening is caused by the filler; therefore, when a particular job is to be done, the operator should be very careful to choose a soft machinable rod. A simple way to test the gray-iron rod for hardness, is to break a small piece off; if it is white to the center it is unfit for use on most kinds of work;

the eye, but has a smooth glassy surface. The soft iron has a gray color and is the same shade in all parts of the break. The larger and brighter the grains, the softer and better is the iron.

On the other hand, the iron may show large grains and still make a hard weld on account of chemical changes during the welding process, therefore, use every precaution while welding.

To explain the word carbonizing, scientifically, would entail a lot of technical phraseology, so we will put it into simpler terms. Carbonizing causes the metal to be quite worthless, turning it into a brittle, lifeless substance. In other words, it removes the metallic iron and leaves carbon. This is true according to the extent of the carbonizing. A badly carbonized piece of cast-iron while seemingly alright, may be broken almost with the fingers alone, or reduced to crumbs with a hammer. It has a dead ashen look.

Do not depend too much upon the flux to prevent or cure carbonizing, for it can only assist in a limited way. Look more to the purity and pressure of the acetylene. Be sure the torch is working right and regulated to the proper working flame, for the kind of metal. Better to use the slower way of the neutral flame, than to ruin the weld.

To sum it all up: while the flux does not make or guarantee the weld,

glue for outside work: Dissolve gum-sandarac and mastic, of each a quarter of an ounce, in a quarter of a pint of spirits of wine, to which add a quarter of an ounce of clear turpentine; now take strong glue, or that in which isinglass has been dissolved; then, putting the gums into a double glue-pot, add by degrees the glue, constantly stirring it over the fire till the whole is well incorporated; strain it through a cloth, and it is ready for use. You may now return it to the glue-pot and add half an ounce of very finely powdered glass; use it quite hot. If you join two pieces of wood together with it, you may, when perfectly hard and dry immerse it in water and the joint will not separate.

Wire mesh is useful for drawer bottoms in tool cases where dirt is likely to accumulate.



Queries— Answers— Notes

Some Minnesota Prices—Enclosed find check for \$8.00 for which put me at the top of the list of your subscribers—15 years more, and let them all know that there is one live wire in a Minnesota town.

Here are some of my prices:

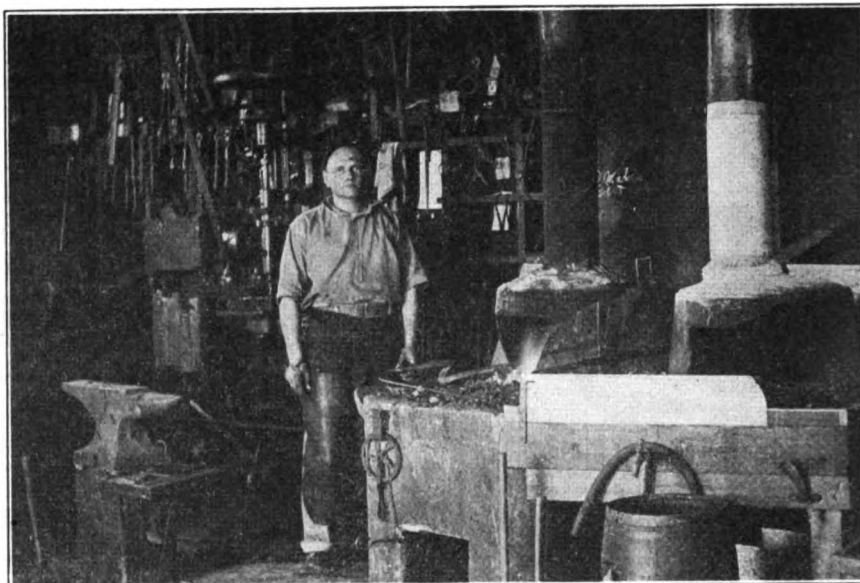
New Shoes, Common	\$.75
Setting Shoes .....	.40
Plow-Lay Sharpening, all sizes	
Straight	1.00
Tire Setting 3-inch wide each.....	1.00
Buggy Tires set each .....	.75
Wagon Tongue New Stick	4.00
½ Rim in Wheel	\$1.00 to \$1.25
Wagon Cut Down, Truck size, 3-in.	
tire x ¾ thick	24.00
Spokes, one or more, straight .....	.35

These are just a few of my prices, and all the rest of my work is gauged accordingly. Now I would like to see some of the rest of the boys wake up, and make up their minds that they can not work for a mere living. A good job is worth money and a poor job is worth nothing at any price.

H. E. PASS, Minnesota.

A Few Pointers on Shoeing—To my brother smiths, I will say there is only one way to shoe a horse and that is to shoe him right.

Practically all horses should be shod in front with a broad-web, light-front shoe. For a toe that is split, set your toe as far back as you can and hollow out the toe so as to leave no weight on crack in the toe. There is no earthly reason why some smiths should put a rivet in the hoof when shoeing for split toe. I always hollow out the toe so there is no pressure on the crack and weld a toe well set back. If this is



SERGEANT J. H. B., ONE OF UNCLE SAM'S STURDY SMITHS AT HIS FORGE
IN THE ARMY SHOPS AT FORT S—

properly done, the crack will grow together after a few shoeings.

I shoe for forging or over-reaching very light in front. Hind shoes should be 1 inch with 4 or 5 ounce heels, slightly turned out in case there are corns. I pare out as much as possible and burn with hot iron, melt shoe-maker's wax and put into the corn. Cave the wall out some so the shoe does not rest over the corn.

Pay for smiths is better now than ever before, so to the young man who is learning the trade, I say, stick to it. One of the best jobs I ever had was blacking at a coal mine. At most coal mines the pay was \$4.50 for 8 hour's work. The mines I worked at had 5 mules and two horses. The mine drivers tormented the mules to get them to kick, and when I took the job of smithing, the first job was shoeing one of these kicking mules. They had no strap or stock, and I was in a fix, for in kicking this mule could easily out do Dan Rice's trick one. But the mine drivers said I could shoe him easily. One big miner got on his back. They put tongs on both ears and a trick on his nose and he stood like a lamb.

CHAS. GORSUCH, Pennsylvania.

Ford Rear Wheel Throws Oil—I am a subscriber to your paper and would like to know how to stop the hind wheel of a Ford car from throwing oil. I have used washers but without any result.

JOE WALKER, Kansas.

In Reply:—In the case of a Ford car where the rear wheels throw oil badly, the first thing to do is to make sure that the rear axle does not have too much oil or grease in it. As the Ford rear axle housing does not have a "drain" plug, it will be necessary to loosen all the clamp bolts around the axle.

Do not unscrew the nuts entirely—loosen them, say 1/32" or a little more. If this does not allow the two halves of the housing to spring apart at the bottom to let the oil or grease out, it will then be necessary to loosen the nuts more at the top and separate the halves at the bottom by means of a thin-edged tool—a screw driver, say. The thin grease or oil should then run out quite readily.

When the oil is entirely drained off, tighten up all bolts and nuts you have loosened—making sure not to miss any nut-locking devices such as lock washers, split pins, etc.—and put in not more than one pint of light gear grease. The writer prefers this although many prefer an extra heavy oil (as the Standard Oil Co.'s No. 600 or what other companies sometimes call "transmission" oil).

Clean up the wheel bearings and wheels and give the car a trial.

If wheels continue to throw oil then the "last resort" is to drill a ¼" or ⅝" hole in the bottom of the axle housing about halfway between each wheel and the center of the axle on side where oil throwing occurs.

This hole allows the oil or grease to flow out onto the street or road before it gets to the wheel.

C. H. WHITE, New York.

Tells How to Weld Broken Axles and a Well-drilling Rein Repair—I owe you two things, a letter and remittance for our journal, so will discharge both debts now: I have worked at the trade 43 years, having started when I was only 13 years old in Cornwall, England. In that length of time I have worked 20 years for myself and the balance for railroad; contract shops, saw mills, logging camps and shoeing shops.

This is the only place I ever ran a shop of my own, and when I quit running this shop I am through. I am situated about 20 miles from the Sacramento Valley in the mountains and 26 miles from the nearest shops, but am not isolated by any means. We have daily mail, 3 stores, telephones and one of the largest electrical companies in the state. The power houses are run by water power for we have here numerous large mountain streams of the purest water.

I have always made my own prices since running this shop in spite of four different competitors, which I have had at one time or another. As soon as a new man came in I made it my business to see him, told him my prices, posted him on poor-paying customers, loaned him or sold him stock, and when he got ready to quit

bought his stock. Consequently we got along in fine shape and parted better friends than when we started.

I do anything from repairing buggy wheels to building a logging truck with 4 in. axles and 6 in. tires.

I like all of our journal, but, especially letters from other iron burners. I see where some one asked about the welding of a broken hollow or tubular axle. Since running this shop I have welded over 50 axles broken at the shoulder—solid and from 1" to 3" in diameter; and some of the tubular axles I welded stood to wear the wagon out and the remains of the old gears are there now. My method of welding tubular axles is as follows: hollow or scarf on horn of anvil both ends as shown in Fig. 1 at A. Then make a piece as at B with centre half again as thick as outside of pipe. Now get forged piece hot, drive broken ends on, get a good heat and drive together—in the fire, if possible; if not drive together on the anvil fore you come down on top of heat. This makes the axle solid at the point of welding.

Last summer I welded 3 sets of well-drilling jars—one broken at the crotch, one 1½ inches and one three inches from the crotch. The drills were working in very hard rock with numerous nigger-heads. Lots of days the drill only went 6" in eight hours, although I hardened the drills in salt and water and also used cyanide of potassium on them at times, and on broken points. The continual jar broke the reins however, and I repaired them as follows and they are going yet:

I made a piece like that shown in Fig 2 at B, of good iron or soft steel, plenty wide and deep, and after taking good separate heats laid in the angle cut out of

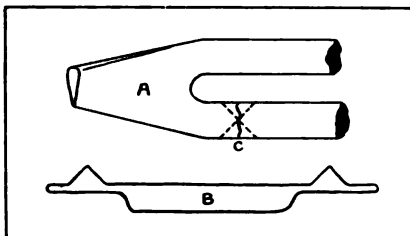


FIG. 2—F. W.'S REPAIR FOR A BROKEN WELL DRILLING REIN

side of rein at crack (see C on piece A, and welded. When welded on one side I cut another angle directly underneath and worked from the other side in the same manner. When welded solid I trimmed off surplus metal inside and out.

In doing work of this kind, I make two pieces ready to lay in before I cut out angle pieces, so I lose no time when I commence to weld. I make these pieces at both ends of the one bar as shown at B, Fig. 2.

F. W., California.

Tightening Loose Auto Rims—What can be done to tighten the rims on automobile wheels when they become loose?

H. EARL YOUNG, Kansas.

In Reply:—If the loose rim mentioned is on the common type of wood wheel where the felloe comes just inside the regular clincher or Q. D. rim, then the only way to make a first class job is to entirely remove the rim from the felloe, and put a thin band of sheet iron around the outside of the felloe. The thickness of the sheet iron to be used can be determined before removing the rim by

observing and estimating the degree of looseness.

The rim should then be "shrunk" on in the usual way.

If the rim in question is the demountable rim which is secured by lugs to the wheel, it will be necessary to shim up these lugs or to permanently increase the wedging effect of the lugs by building on metal with an Oxy-Acetylene Welding torch.

If the rim has been damaged by hammering or running with tires flat it may be necessary to purchase a new rim.

In the case of demountable rims where the car has been driven without the tire rim, then frequently the thinner steel rim around the felloe has been crushed-in or damaged. In this case it is obvious that the entire felloe and often the felloe rim will have to be replaced with a new one.

C. L. WHITE, New York.

Trouble Welding Sickles—I am asking you for some advice on how to weld sickles. I have a good many to weld here but have some trouble with them. Whenever I put in a new piece of bar and upset each end and take separate heats I can get a perfect weld but when I weld the old pieces together by laying in a thin piece I have trouble getting the ends of layed-in piece to weld, the ends marked X in the diagram. I get all parts as close together as possible before taking the welding heat and use welding compound and borax. Sometimes I make a success of it and sometimes I don't. I am a beginner in the business and it's the only way I know how to do the job. Any information about it that you can give will be greatly appreciated.

FRANK T. BERRY, Arizona.

In Reply:—The sickle to which you have reference is no doubt the ordinary cutter knife of the harvesting machine. This is very probably of medium steel.

You say that when you put in a new piece of the bar itself you get a perfect weld; but when you lay in other than this piece you have trouble.

Your difficulty in the latter case, it would seem, was caused by using metal of a different nature than that of the piece being welded in making the joint.

No man can make a good weld—if he can even succeed in making one at all, when the metals joined are of a radically different nature. The strip which you used to place between the two broken ends was likely some piece of scrap metal picked up at random around the shop. It might be high-carbon steel or possibly even soft iron. And if such is the case, your welds would of course be a failure.

Keep this in mind the next time you make a weld. It would be a good idea if you could get hold of some scrap harvester machinery and simply keep on hand pieces to be used in jobs of this character. Then, other things being equal, you should have no further trouble with your welds.

S. S., New York.

From a Blacksmith in the Army—Brother Blacksmiths, as I never sent anything into our journal before, I will try it once anyway. I have never done any automobile repairing to speak of, but here I have anything and everything to do from repairing pencil sharpeners and typewriters to auto trucks, etc. There is nothing brought to the shop for me to repair but what I try it and do my best as in civilian life. I have been at the business 17 years and

like the trade and every branch of it. Horseshoeing, repairing buggies, wagons, farm implements or any old thing or any work connected with it.

One day one of our officers drove up to the shop and said to me: "Sergeant, can

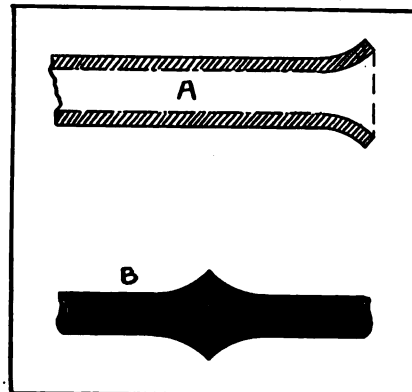


FIG. 1—AN AXLE REPAIR DESCRIBED BY F. W., CALIF.

you tell me what is wrong with the wheels of this machine? They are always squeaking." I stepped on the running board and asked him to run the machine until I determined where the trouble was. I discovered where it was. I first screwed up the bolts tight that held the tire on the wheel. But after a few miles' travel and they were as bad as ever, and he came in again. I took the bolts out of all the wheels and on top of each one put a piece of heavy galvanized tin cut like the shape shown in the accompanying sketch, and bent them down at the dotted lines. I bent the sides and the end that goes in first; then screwed the tin fast. I then took a calking tool and set the tin down tight. I made the wheel as good and free from squeaking as when new. After being tightened the tin is bent to shape so that while changing tires they do not fall off. Of course, if I was where I could buy such things I wouldn't have to do some of the things that are often necessary. There are lots of such things I do here that I never thought of in the States as new. Pieces could be bought cheaper than repairing the old ones.

I get anything I ask for in the line of my trade pertaining to my work. There are two blacksmiths, one helper and two shoers in the shop. I am in charge, as I am the oldest man in the shop, but among us there is no boss required. No matter what comes to the shop, we all help one another out at his work and everything goes smoothly. From my experience in business for myself and working for other blacksmiths the shops are few and far between that are run as pleasantly as this shop of Uncle Sam's. We have electric blowers, a motor to run the drill press and emery wheels. We have an L. S. P. Calking Machine and also shoeing stocks, so if a mule or horse wants to put up a fight we just put him in the stocks and let him fight it out. Believe me, we get some bad ones to shoe, but they don't come too wild and wooly for this bunch of blacksmiths.

I hope soon to hear from some other brother blacksmiths through these columns—those who have not written before.

The photo shows me at work in one corner of the shop.

SERGEANT J. H. B., Fort S—, "Somewhere in U. S. A."



The Automobile Repairman

The Care of Tires*—6

Helpful Hints for the Automobile Repairman

The service of tires will be abbreviated, to a considerable extent, if cuts, punctures and snags are neglected. Too much care cannot be exercised in avoiding injuries of this nature, as much as possible or, at least, give them the proper attention within a reasonable period.

New macadam roads, especially when wet, are liable to damage the rubber cover. It is recommended that the speed of the car be slightly accelerated and clutch depressed before coming up to loose, crushed stone in the road; it is better to coast over sharp stones rather than cause more tire traction by leaving gears engaged.

The rubber cover may receive numerous small snags and cuts if rear wheels lose traction and spin around on wet pavements or in mud or sand. If rear wheels slip, back car for a short distance and then start forward. When this fails, jack up rear wheels and wrap with rope or place something firm underneath to give the tires a grip.

The elasticity of the rubber permits a cut in the tread to expand when under the weight of machine and in contact with the road. In this way, such foreign matter as grit, sand and pebbles are forced into the cut. With each revolution of the wheel, the accumulation of foreign matter acts as a wedge and further forces itself between the cover and fabric of the tire. It is not unusual for these lumps or "mud boils," if neglected, to cause a complete separation of the tread. An entire new cover can often be applied in a satisfactory manner, providing the fabric is in fairly good condition, but it is

*Courtesy Firestone Tire & Rubber Co.

more practical and certainly less expensive to attend to the initial injuries when first noticed.

Owners are sometimes surprised and disappointed to learn from the repair man that it is not advisable to rebuild tires having good covers and appearing, from the outside, to be all right. This is often due to separation and decay of the fabric body caused by water working through neglected cuts.

It is suggested that after a long trip, or at regular intervals, the tires be examined carefully. Remove tacks, glass, nails and other objects before they cause serious damage; wash mud and other foreign matter from the tires and heal the cuts, punctures and snags with cut-cure or similar preparations on the market for emergency repairs. If unable to repair the injuries in this way, have the work handled by an experienced and competent repair shop.

It is pretty generally known that gasoline, grease, oil and other fatty substances are solvents of rubber. Oiled parkways and roads are not particularly harmful, especially after the oil has soaked into the roadway.

If garage floors are not kept clean

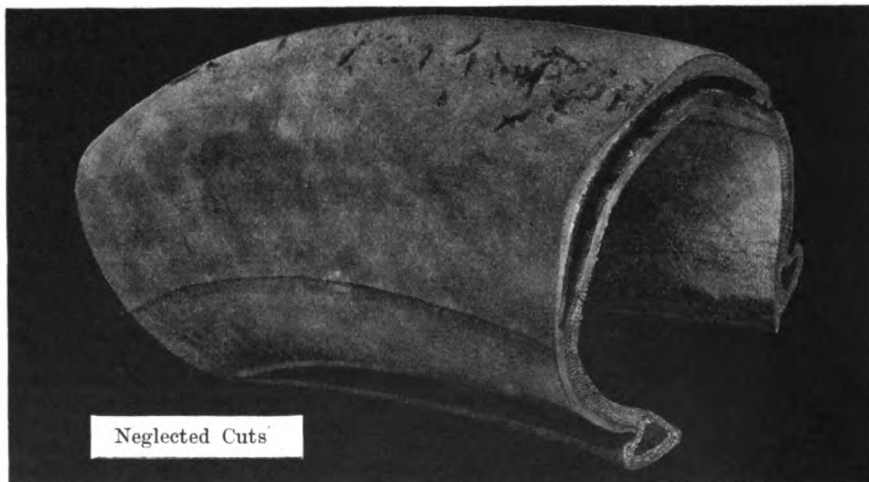
from loose bearings, too much grease or from using grease not suitable for differential.

Grease and oil can be very easily removed by a rag saturated with gasoline. Gasoline, although a solvent, evaporates quickly and, if applied in small quantities will not, therefore, cause any injury when used as a cleansing agent. Ordinary injuries to the rubber cover do not prevent successful repairs but not often can the work be well done when materials have been affected by oil or grease. If either soaks into the fabric, the repair work will invariably blister during vulcanization.

It is recommended that when either the tread or side walls show a softening effect from oil or grease, the tire be reversed on the wheel, i. e., the damaged side wall changed to the outside. This will usually protect the side wall from further accumulation of grease—the change will also rest the tread and fabric of the tire by reversing the direction of the traction strains.

Anti-skid devices are helpful, under certain conditions, but great harm will result from continued use when not actually needed.

Some devices are noisy and there is a temptation to fasten same tight-



TREAD SEPARATION: NOTE THE NUMEROUS SMALL SNAGS AND CUTS IN THE TREAD. WATER, SAND, ETC., WORKING THROUGH THESE OPENINGS DAMAGED TIRE AS SHOWN.

and the tires stand in a pool of oil, the treads soften and the traction strains in service stretches the rubber in a wavy outline, eventually causing it to separate from the fabric body underneath.

Probably the most damage is experienced from grease, indifferent housing, working out into the brake drums and then onto the side walls of the tires. This may result

ly to the tires. When this is done, the extra pressure and flattening out of the tires, at point in contact with the ground, will cause the cross grips to cut and gouge into the rubber cover and fabric underneath. Some devices are not apt to be effective, if fitted too tight, and the tire will spin around. When cross grips become worn, sharp and rough, they should be replaced,



otherwise cutting of the cover cannot be avoided.

Be careful that a sharp turn of front wheels does not result in treads being rubbed by spring shackles or other sharp projecting objects. If a bumper or guard be applied to front of car, be sure that the ends permit of enough clearance for the front tires so that the same will not be gouged when making a sharp turn.

When the car is loaded heavily, there is danger of the tire treads being bumped or gouged by fender when passing over rough places in the street or road. Fenders bent from accidents may be entirely too close to the tires and cause a great deal of injury, particularly if there are any sharp extending bolts underneath the fender. An inspection under fenders sometimes discloses bolts worn smooth and bright due to continued buffing and rubbing by tires.

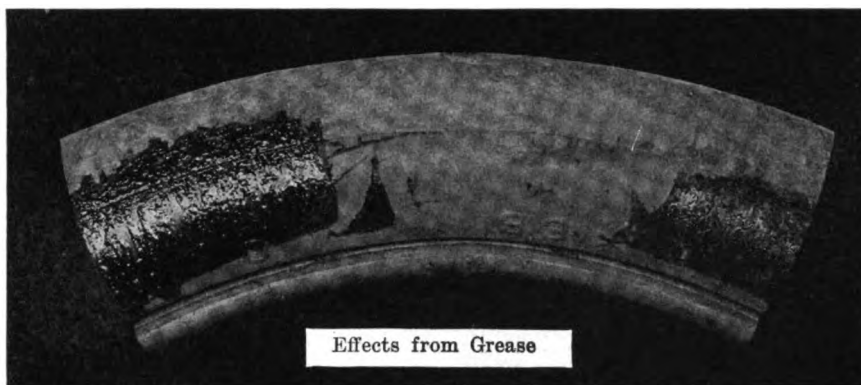
If a change be made from regular to oversize tires, make sure that there will be sufficient clearance between tires and mud guards when car is loaded to capacity—this is, however, provided for by most car manufacturers.

The treads of rear tires are sometimes cut and snagged when wheels slip and spin in mud or on icy pavements.

It is advisable to have the damage repaired before moisture and dirt work under the rubber cover and affect the fabric.

Tire chains, improperly or carelessly applied, are common cause of injury to the treads of the tires.

Care should be taken that the rounded side of the links lay on the rubber, bringing the rough clinched ends of the cross chain and end



DO NOT USE TOO MUCH GREASE IN DIFFERENTIAL. WHEN GREASE WORKS OUT THROUGH HOUSINGS AND SPLATTERS ON SIDE WALLS OF TIRES, REMOVE IT IMMEDIATELY WITH RAG SATURATED WITH GASOLINE.

links next to the road-surface. In fact, this is necessary to prevent opening of chain links and consequent loss.

Attention should be given to punctures, cuts, snags and other injuries, even though they may appear to be trivial. Small injuries of seeming unimportance often grow into serious consequences. It is advisable to have the repairs made by an experienced workman. As a usual thing, the amateur does not *reinforce* the injury, when needed, and is apt to vulcanize a repair, especially the rubber, too long—this not only makes it hard and brittle but burns the materials *around* the repair.

Some *repair men* are not as expert as they should be in the handling of rubber and fabric. Pieces of fabric of different sizes placed inside of the tire, regardless of the weave of threads, will wrinkle, separate and not afford any appreciable strength or reinforcement. All fabrics, for every style of repair, should be cut on a bias in the same

manner that the fabric is cut for the original construction of tires. Repairs that are hard and bulge are generally a result of cutting the fabric straight with the roll, i. e., lengthwise and with the warp.

Understanding the heat or temperature required for vulcanizing and the use of materials suitable for the style of repair to be made are very necessary to good results.

In this series of articles we have tried to acquaint the reader with tires—their faults, common troubles, causes and remedies. It is hoped that from a careful perusal of these articles that the auto repairman will be in a position to advise his customers on the upkeep of their tires, and to render himself more efficient in their repair.

Questions which may occur in the reader's mind will gladly be answered. Send in your query to the Subscribers' Service Department; or if you have some interesting method of your own to tell about, just send that along too.

Gas Engine Operation Made Simple—12

The Purchase, Installation, Operation and Troubles of a Gas Engine.

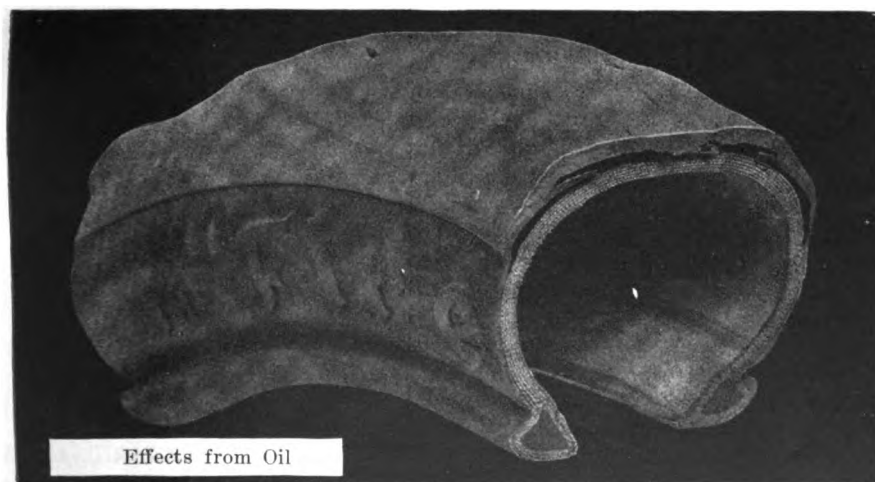
J. L. HOBBS

Compression

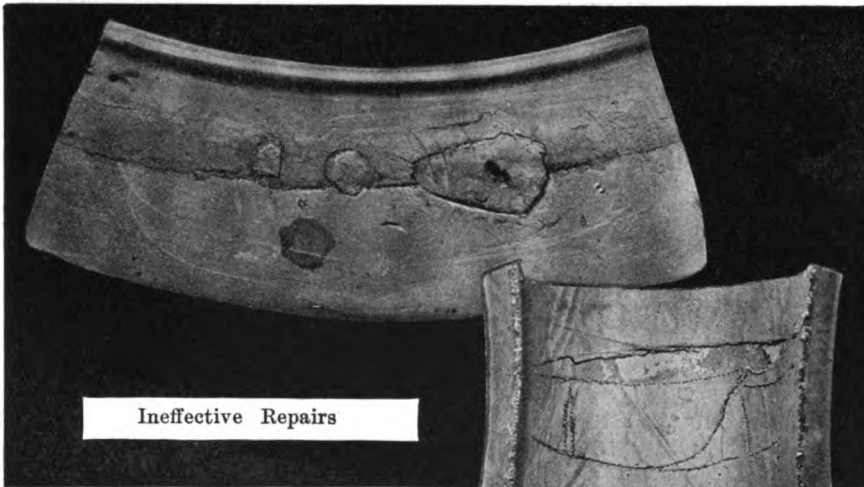
(Continued)

In the last installment we discussed the causes of faulty compression at the crankshaft end of the cylinder. Having thoroughly gone over this end we will turn our attention to the explosion chamber at the other end.

We will here also take up the most important things first, and try to deal with these matters in the order of their importance. The exhaust valve will probably cause the



SHOWING TREAD WHICH HAS BEEN SOFTENED AND SEPARATED FROM CARCASS OF TIRE BY OIL.



Ineffective Repairs

UPPER CUT SHOWS SNAG REPAIRED ON OUTSIDE ONLY WITH NO FABRIC REINFORCEMENT ON INSIDE. AT LOWER RIGHT, SCRAPS OF MATERIAL USED AND IMPROPERLY APPLIED, NOT THEREFORE AFFORDING STRENGTH OR REINFORCEMENT.

most trouble so we will take it up first. The reason it will cause more trouble than the intake valve is very simple—it stands in the path of all the heat of the cylinder. All the burnt gases must pass through it to get to the outside atmosphere, while the intake is constantly cooled by the cooler intake-charge coming through it. The exhaust valve is often warped by the intense heat to which it is exposed. If warped to a visible extent it should immediately be discarded and a new valve ground into its place; as when once started to warp there seems to be no stopping place. This grinding process is very simple and can be accomplished by any one who will go to a hardware store and get a box of valve grinding paste and follow the instruction printed thereon.

The intake valve will, as before stated, cause little trouble; it being necessary only to grind it occasionally. It is a very rare thing for an intake valve to warp; although in an *air cooled engine*, where the cooling fan fails to do its work, even the intake valve will be found warped so that a new one will be necessary.

Where the valves are placed in the cylinder in a separate cage, it will be necessary to either grind the cage into the cylinder or have a proper gasket of some fire proof material to prevent a leak. Where it is necessary to grind the cage into the cylinder, the instructions for grinding a valve will also apply.

You must be very sure that there

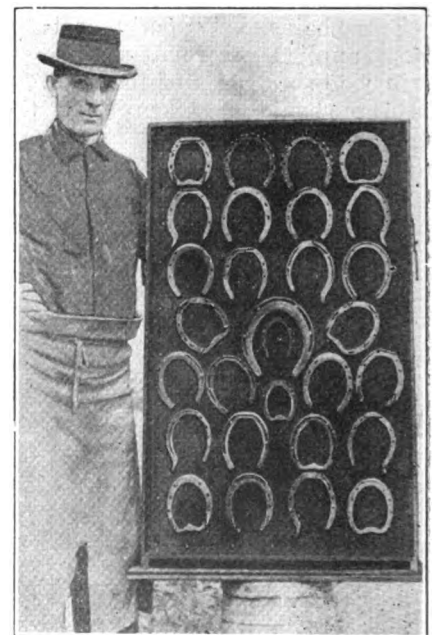
is no leak around or thru the spark plug or igniter. This can be tested with a drop of oil or gasoline, in which case if there be a leak a small bubble will show up on the compression stroke. When a leak is found it is very important to remedy it even if a new plug or igniter is necessary. Any kind of a leak, be it ever so small, is detrimental to the best power from your engine.

Leaks around the priming cups must be stopped, if it is necessary to secure new parts and rethread the place in the cylinder into which they fit. You have probably formed the opinion by this time that the writer is a crank in regard to the keeping of the dirt away from an engine. If you had been in as many different places and seen as many different engines laboring under as many difficulties as he has seen then you would have also learned this most important lesson of successful gas engine operation. We can take you to two engines of about the same size, from the same manufacturer, each supposed to do about the same amount of work. One is in a butcher shop, and is used several hours a day in running meat grinders, feed grinders, fans, and cold storage plants. The operator of this engine is careful to keep it as clean as a new pin, no dirt or gummy oil is allowed to stay on this engine even over night. He wipes it thoroughly after every day's run and makes any necessary adjustments and it is always ready to go. This engine has

been running about nine years and has never caused any delay.

The other engine is in a blacksmith shop, where all the dust and dirt kindred thereto, including the dust from a couple of emery wheels, is allowed to float about the engine at will. No attention is given this engine, except to go around and squirt a lot of oil on it when the operator takes a notion to use it. There is not a month passes but what some new part is ordered for this engine and the owner is always complaining about the service he gets and the expense his engine is to him; but he will not go to the expense of building a separate room for it nor even oil it properly—not even allowing the intake pipe to come from the outside of the building. We have purposely given you these two extremes. We do not expect every gas engine operator to be as good as the first one, if he did the manufacturers would soon be forced to stop the manufacture of repair parts; but the nearer you get to his standard and the further away you keep from the other man's standard, the better service you will get from your engine. You would not think of taking a horse out to work plastered with dirt from one end to the other, and yet you use your engine worse than you would a horse, and expect more of it.

(To be Continued.)



MR. A. G. GILROY OF ONTARIO, AND A FINE CASE OF SHOES FORGED OUT BY HIM FOR THE MECHANICAL TREATMENT OF LAME HORSES.

THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING,
VEHICLE WORK and AUTOMOBILE REPAIRING

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THE ARMY HORSESHOER

There is perhaps no one more competent to write on the subject of army horseshoeing than the army farriers themselves, and we are happy to announce that, beginning with this issue and continuing for several months, there will appear in The American Blacksmith a series of splendid articles prepared by the Army Training School instructors of the Mounted Service School at Fort Riley, Kansas. The text and illustrations are from their official handbook, which is also used widely by the Army at large, and is therefore to be regarded as highly authoritative and practical in every respect.

It is especially timely in view of the wide-spread interest in the care of the army horse which has been manifested of late among horseshoers throughout the country. The training of farriers in the local government schools can benefit but a limited number at best, and with an ever-increasing demand, as war continues, for men highly skilled in the profession, the practical utility of these articles is obvious.

We are greatly indebted to the Mounted Service School and to Captain J. C. Montgomery, Secretary of the School, for their kind permission to reprint matter from their textbook.

MORE ON PAINTING THE AUTOMOBILE

An old-timer of ours, Mr. M. C. Hillick, who is quite as much an artist with the pen as with his paint brush, fires, in this issue, the opening gun of a battery of rapid-fire articles on painting the automobile.

Mr. Hillick is a practical painter himself as well as an authority on subjects pertaining to vehicle painting, and his articles should prove of inestimable value to the man who is taking up this profitable line of work.

YOUR SPARE TIME

How do you use your spare time, Reader? Is it spent in useless gossip—remarks about this person and that one, profitless arguments over the War, keeping that grimy arm chair of yours warm while you dream idle dreams o'er the smoke of your pipe?

Generally speaking, such time is wasted—utterly thrown away. Yet it's these very golden moments that may spell success or mediocrity or even failure for us.

The man who gets ahead, who paves the way for a free, contented old-age, is he who takes advantage of these spare moments to study, to learn more about his craft and to make himself bigger and more useful in every way. And it's remarkable what we can do with these few moments that we all have now and then. An hour's study during each of the long winter evenings, a brief period while we rest at noon, and in a year's time we have invested in the Bank of Opportunity a possible four hundred precious hours to our credit.

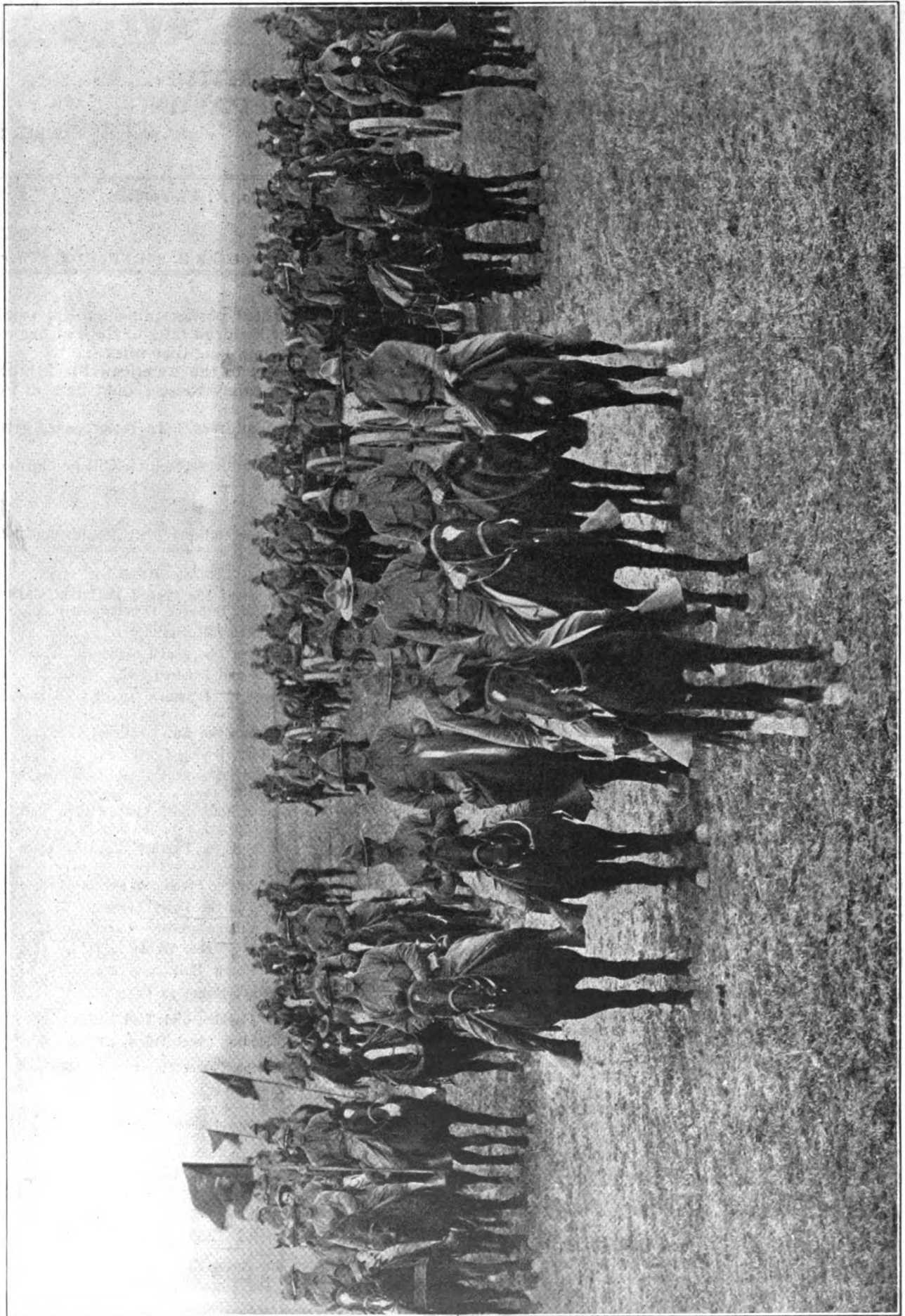
The way is open if we are willing. There are hundreds of excellent books on every phase of the craft; books on scientific horseshoeing, veterinary practice, practical smithing, art forging, steel and metal working, automobile repairing, machine shop work, gas engines, electricity, oxy-acetylene welding, business, etc. Subscriber's Service will gladly help you to choose and get started in the right direction. Better write today for full information and a complete list of the best books.

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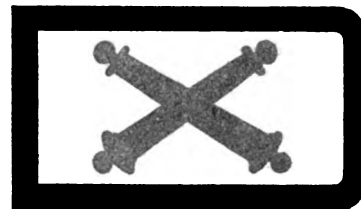
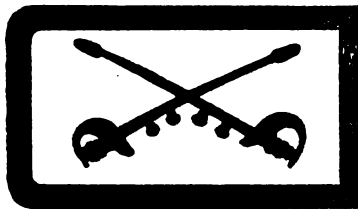
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HORSES OF THE SECOND BATTALION, 3rd N. Y. HEAVY FIELD ARTILLERY, NOW THE 106th U. S. REGULARS



The Army Horseshoer. 5

Horseshoers' Tools and Their Uses

1. The *clinch cutter* (fig. 1) consists of two parts—the blade and the point. The blade is used to cut or to raise the clinches, being placed under the edge of the clinch and struck with the driving hammer. The point is used to punch nails and stubs out of the hoof. It is often placed in the crease of the shoe, under the head of the nail to be withdrawn, and struck smartly with the hammer. The blow raises the nail sufficiently to enable the pinchers to grasp the nail head.

The *pinchers* (fig. 2) are used to remove shoes and to draw nail stubs and improperly driven nails.

The *driving hammer* (shoeing hammer) (fig. 9) should be used only to drive horseshoe nails, to wring off nails after they have been properly driven, and to make clinches.

The *nippers* (fig. 4) are used to remove the surplus growth of wall.

The *shoeing knife* (fig. 3) is used to pare away the dead horn near the white line; to make a seat for clips; to remove loose particles from the hoof; to relieve pressure on corns and cracks; and to open the sole and wall for the escape of pus or for the removal of foreign bodies.

The *horseshoers' rasp* (fig. 5) is used to prepare a level bearing surface of the foot; to remove extra length of toe; to smooth the edges of the wall; to even clinches; to make a slight groove under each clinch; and to run lightly over the clinches in order to smooth them.

The *fitting hammers* (figs. 10 and 11) are used in fitting and in turning shoes.

The *hoof tester* (fig. 7) is used to locate injuries or soreness of the sole. Place one point on the sole and the other on the wall; press by closing the handles; shift the points and continue until the horse flinches. The pinchers may be used for the same purpose, but are not as satisfactory.

The *clinch tongs* (fig. 6) are

used to draw down the clinches.

The *clinch block* (fig. 15) is used to turn the clinches.

The *tongs* (fig. 8) are used in handling hot metals.

The *pritchel* (fig. 16) is made by hand from round or octagonal steel, and is used for opening the nail holes in horseshoes. The point is drawn the same size and shape as the shank of a nail halfway between head and point, so that the hole punched in the shoe will fit the nail snugly and not allow much motion. Examine the nail carefully and learn the exact size for the pritchel. To draw out the point of the pritchel, heat it to a cherry red and, placing the pointed end flat on the face of the anvil near the far edge, strike with the hammer held at an angle to properly change the upper face, turning it as necessary so that the finished point will be of the shape desired. Never heat the pritchel beyond a cherry red; cool it gradually by placing it in the coal at the edge of the forge and never in the water. The face of the horseshoer's anvil should have a round edge near the base of the horn on the far side. This edge is used for sharpening tools.

Hardies, the straight (fig. 12) and the half-round (fig. 13), are used to cut hot metals. Their principal use for horseshoers is in cutting off the heels of shoes, and for this purpose a sharp cutting edge is required. When the hardy becomes dull the edge is drawn out on the face of the anvil in the same manner as the pritchel. A sharp edge is then put

on by hot rasping, using the smooth side of the rasp. After sharpening, the *cutting edge* should be tempered as follows: Heat the blade of the hardy slowly to a cherry red; hold the cutting edge under water so that about one-half of the blade is immersed, and, when there is no longer any sizzling, plunge the whole hardy under water and remove it at once; rub the blade on the floor to remove loose flakes of metal and to give it a slight polish; now carefully observe the change in color as the remaining heat in the body extends back to the edge; the color will be first straw, then copper, and finally blue; as soon as the blue color has reached the cutting edge, place the whole hardy under water and leave it there until thoroughly cooled.

The *creaser* (fig. 14) is used to crease the shoes and to repair damaged creases.

The *countersink* (fig. 17) is used in hand-made shoes to punch holes of sufficient size to receive the heads of the nails; these holes are completed by the use of the pritchel (fig. 16).

Horseshoe nails retain the shoe on the foot. These nails (furnished in several sizes) are machine made and pointed; they are slightly concave on one side and flat on the other; there is a short bevel at the point on the concave side. In driving the nail into the hoof the flat side is held faced forward.

The Anvil

2. The working parts of the anvil (plate II., fig. 1) are the *horn*, the *face* and the *heel*.

The face, or the upper plane surface, is of steel, and is welded to the iron body. The anvil is firmly fastened to a wooden block, which is sunk into the ground to a depth that will bring the surface of the face at a convenient working height above the ground—from 30 to 36 inches.

The horn is used to open and to shape shoes; the face to level the web and for welding; and the heel



THE CHEVRON OF THE ARMY
HORSESHOERS



to straighten heels of shoes and to turn calks. Clips are ordinarily drawn on the edge of the face, but in the anvil shown there is an attachment near the base of the horn which is used for this purpose. The square hole in the face (hardy hole) is a socket for hardies; the round hole (pritchel hole) permits the passage of the pritchel through the nail hole of the shoe.

The anvil weighs from 125 to 150 pounds.

Figure 2 shows the tool box regularly issued by the Quartermaster's Department of the Army. Its use is readily understood and the only instruction required is that all tools should be placed in the box, handles out. An objection to this box is that it is easily tipped over. On this account many shoers prefer the pattern shown in figure 3, although the tools are not as near to the hand.

3. Plate III. shows a section of a portable forge. In every forge, air is forced through the fire by a bellows or a fan (F); the latter is made to revolve by a drive wheel or by a handle (H). The twyer ball (T) corresponds to the grate of a stove. Firmly attached to it and extending towards the worker is an iron rod by which the ball may be rocked. The end of this rod is shown by the small circle of the twyer ball. A crater (C) should be made around the twyer ball in order to confine the fire. Clay may be used for this purpose, but cement is better.

4. The field outfit issued by the Ordnance Department is designed especially for portability and is packed in two chests.

Chest No. 1 (22 by 18 by 13 inches) contains a small knock-down forge with fan and drive wheel and a complete set of forge and shoeing tools. Weight of chest, packed, is 122 pounds.

Chest No. 2 (21 by 17 by 10 inches) contains a small anvil and block, water bucket, leather shoeing box, and apron. Weight of chest, packed, 68 pounds.

The field anvil weighs 17 pounds.

The Fire—Heats.

The Fire

5. Coal, charcoal, coke, or even wood, may be used as fuel to create the necessary heat in the forge.

Before building the fire, the crater of the forge must be thoroughly cleaned, removing all dirt, ashes, and unconsumed fuel. The twyer ball should be rocked vigorously, and the slide (S) opened. A few blasts will aid in removing the accumulated dust. The ball is often so heated as to fuse, and melted metal and clinkers may close the openings around the ball, preventing the passage of the blast. The obstructions must be removed by the use of the poker.

Coal is banked around the twyer ball in the form of a crater, in the center of which dry particles of any inflammable material are placed and ignited. When these particles are burning, coke or wet coal (if no coke is available) is gradually placed on the fire and the fan is revolved slow-

which interferes with the work.

A clear fire without smoke is essential for good work, and the higher degrees of heat can only be obtained from such a fire.

The depth of the fire should be about 9 inches; the metal is then supported at the place of greatest heat, about 6 inches above the twyer ball.

If the metal is too near the twyer ball the heat is affected by the cold blast.

To bank a fire, cover thoroughly with the fuel and *open the slide below*; this will keep the fire alive for several hours.

Clinkers

6. Heated steel or iron gives off particles or scales which remain in the fire. These melting particles bind together particles of burned coal, gradually becoming larger and finally forming what is called a clinker. Clinkers give off but little heat and obstruct and spoil the fire; they must therefore be removed as fast as they form. Their presence will be shown by a tendency of the fire to spread and an unusual throwing out of sparks. If indications of clinkers appear, open up the fire with a poker, and as soon as the air touches the clinker it will turn black and become a solid mass which can be lifted out entire. Trying to drag out the clinker without opening up the fire only results in breaking up the clinker and making the fire worse than it was before.

Heats

7. There are four degrees of heat that are to be considered by the horseshoer, and they are generally designed as the *black*, the *cherry red*, the *white*, and the *welding or sparking heat*.

The *black heat* is when the shoe is hot but shows no color, and is used in making minor changes in shaping, leveling, and in opening nail holes.

The *cherry red heat* is when the steel or iron shows a bright cherry-colored glow. It is used in the general shaping of the shoe, in pointing the pritchel, and in sharpening tools.

The next degree of heat is called the *white heat* because the steel or iron then shows almost that color. This heat is used when it is necessary that the metal should be very pliable and easily worked, as in drawing toe

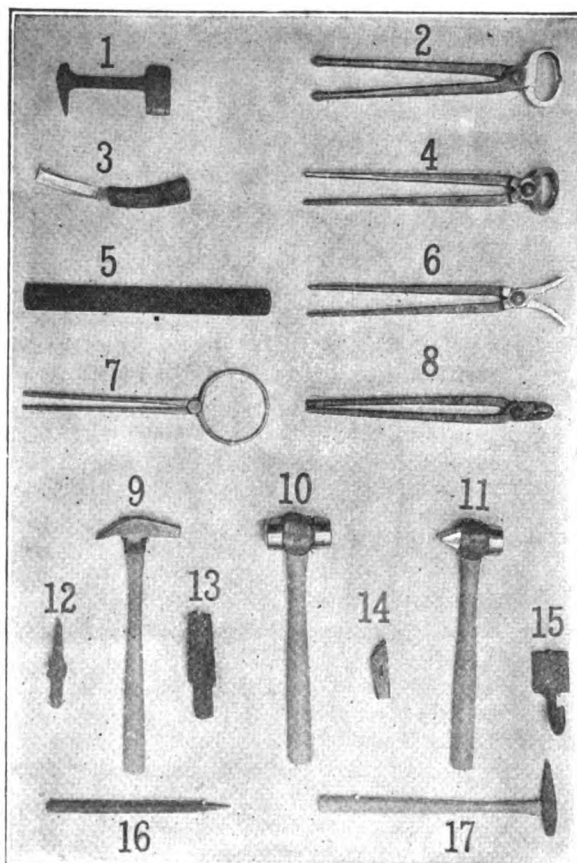


PLATE I.—THE FARRIER'S TOOLS

ly, care being taken not to cover so closely that the flames are smothered.

When the fire is burning brightly, it should be built up around the edges with wet coal, which will in time become coke. (See Heats.) This coke is next burned and is replaced by wet coal, thus keeping up the supply of coke. Green coal is of little use in heating iron or steel for the reason that it does not give a high degree of heat, that it sticks to the metal, and that it emits a smoke



clips, cutting off the heels, in drawing the heels of the shoe, in hot rasping, and in turning heel calks.

The *welding heat* is sometimes called *sparking heat* for the reason that the metal then gives off small particles which explode or spark above the fire. As soon as the sparks appear watch the metal closely, and when the part to be welded has a bubbling (fluxing) appearance it must be withdrawn from the fire and worked immediately. The success of a weld depends entirely upon the proper heat of the parts at the exact moment the weld is attempted.

A newly made coal fire can be used for ordinary heating, but for a welding heat coke is required. Coke is ordinary coal from which the gases have been driven off by gradual heating. It will be found ready at hand around the edge of the fire. As coke does not smoke, there is no trouble in observing when the metal has reached exact welding heat.

(To be Continued.)

Western Shops and Signs

JAMES A. PATTERSON

Every hamlet and main traveled road in the West, at average intervals of ten miles apart, now has its blacksmith shop. Many of them have unique or elaborate signs to catch the attention of passersby. In my travels I jotted down a few names that struck me as being apropos, picturesque, typifying some whim or ideal of the proprietor; some of them being incongruous—having little or no connection with the craft which they are supposed to represent. At some of these shops I was merely a casual visitor; in others I was temporarily employed in order to help out with delayed work.

A shop in the eastern suburbs of Denver uses this sign: *Nonpareil Blacksmith Shop*. Whether or not the shop measures up to its name, I think this very good, implying as it does, "One who, or that which is of unequalled excellence."

A blacksmith having a small shop on the state line between New Mexico and Colorado, owned a horse named Comanche, which he once entered in a race in the near-by town of Raton on the national holiday. The horse won the race and received the prize of \$50. In his enthusiasm

over the event, the man had the horse photographed, forwarded the photo to a pictorial artist in Trinidad with order to paint a life-size picture of

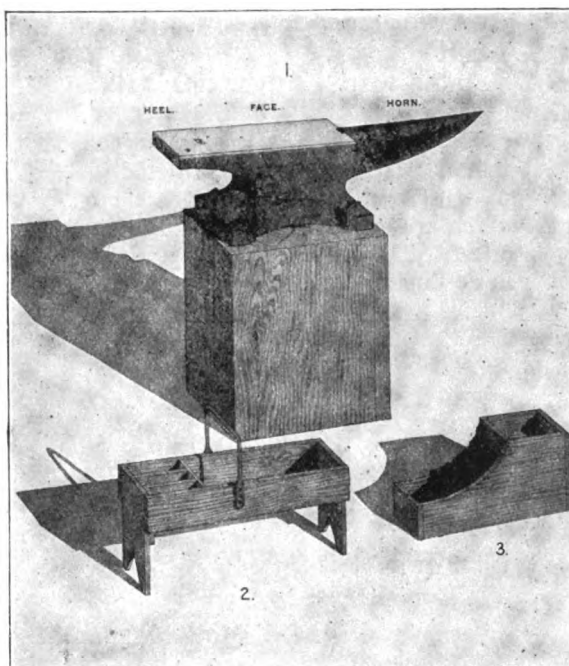


PLATE II.—THE ANVIL AND TOOL BOXES

the horse. This 12 x 14-foot board sign he placed on the roof of shop; also named the shop after the horse. While the prime object of the blacksmith was to express admiration for his horse, the combination proved to be a good advertisement. The man prospered, enlarged his shop, engaged a helper, and recently sold out; having made enough money in seven years to permit him to retire to a five-acre homestead in the suburbs of the town where his horse had won the race.

Crusade Horse Shoeing and Repair Shop greets one as he journeys over the road from Chama to Terra Amarilla, New Mexico. A 10 x 12-foot board on the roof shows picture of mounted knight clad in medieval armour, bearing gonfalon approaching shop, at the door of which stands a robust, curly-haired smith garbed in shoes, trousers, red undershirt, and leather apron. Inference being that when the standard-bearer of the legion patronizes a certain blacksmith presumably all the knights of the banner will follow suit. A story is told that this blacksmith traces his lineage to an ancestor who distinguished himself in the crusades to the holy land; hence his use of the name and figure.

In the foothills 22 miles west of Denver stands a modest little log cabin serving the double purpose of

shop and dwelling house for a blacksmith named Albert Noxon, whose wife is an active consort. Nothing larger than a shetland pony could enter the door; the smithy doing all his horse shoeing and most of his other work outside under a 15 x 20-foot awning reaching from cabin roof to a piece of 2 x 4 resting on three posts set in the ground. A canvas partition separates the cabin into two halves—one half being used for living rooms, the other half for the forge and tools. The sign above the door reads: *Vulcan's Home*.

On the road leading from Cheyenne to Laramie, Wyoming, is a 25 x 75-foot shop, called the *Round-Up*; built with train-shed roof and spacious doors at both ends so that automobile or team with wagon may enter at one end, have repairs made and drive out the other end of the shop—simply making a crescent-shaped detour from the main road. One end of the

shop is fitted with service station, tools and accessories for auto repairing, the other end with equipment for horse shoeing and general blacksmithing.

On a popular highway in the Arkansas Valley stands a shop named *Lily of the Valley Blacksmith Shop*. At first glance this seems a rather incongruous name for a shop; but old residents hand down this story in connection therewith: Twenty-seven years ago a man named Louis Overton built the shop. He had a daughter called Ethel, just budding into womanhood. At the Christmas festival and round-up of cowboys in the hamlet of Malta, Ethel was 'among those present' as was also a tourist who happened to be in the village at the time. After the traveler had given the crowd the 'once over' his eyes rested upon Ethel. Turning to a near-by cowboy he requested an introduction, saying as he did so: "I presume she's the Lily of the Valley." The remark finally reached the ears of Overton, who either felt elated at the delicate compliment paid to his daughter, or possibly thought the phrase euphonious. At any rate, a few weeks later a sign: *Lily of the Valley Blacksmith Shop*, appeared above the entrance. The blacksmith never admitted how he got or why he used the name. Ethel later married, not the tourist,



but a stockman and went to live on a distant ranch. Overton has passed to the spirit world; his nephew now runs the shop, and although the sign has been twice renewed and repainted several times it still reads: *Lily of the Valley*.

About sixteen miles south of Pueblo where the main road crosses the county line is a shop called the *Centennial Shoeing Shop*—name on the roof, probably after the nickname often applied to Colorado because of being admitted to the Union in 1876. On one end of the shop is painted an elaborate picture of the Columbine (state flower); on the other end, "Nil sin numine" (state motto), showing that the proprietor is infused with a large measure of local patriotism.

El Dorado Blacksmith Shop flashes into view as one rounds a curve on the road leading from Boulder to the tungsten mining district of Nederland, Colo. It requires a vivid imagination to couple the name, even in a figurative sense, with an ordinary blacksmith shop. However, this shop is unique in its manner of construction. The place was simply a 30 x 40-foot recess in the face of a cliff; two charges of powder having blasted away enough of the shale rock to give a level floor; the ends of three saplings inserted into the niches in each of the two side walls formed the rafters on which were laid boards covered with heavy tar paper held down with battens, having sufficient incline to the rear to shed the rain while canvas that could be rolled up in day time and let down at night covered the entire front and small apertures on each side. One of the two men who conducted this shop was an expert in tempering mining tools, the other one had a fair knowledge of automobile repairing. In October, 1915, when the tungsten boom gave an impetus to travel and investment, they launched their venture; installed a good outfit, hung out two blazing red placards: "*Mining Tools Tempered, Repointed*", "*Automobiles Repaired, Gasoline Supplied*." They bached in the shop; and it is said that they made enough money during the first half of 1916 to enable them to open

a first class shop in the town of Longmont after the mining boom collapsed in September 1916 (owing to drop in the price of tungsten.) In view of the outcome, perhaps the name was appropriate.

Corns and Kindred Evils

A. L. CAMP

Of all the afflictions to which the domesticated horse is addicted I know of none as universal as those which are caused by corns. The resultant afflictions are many and include incipient soreness, extreme

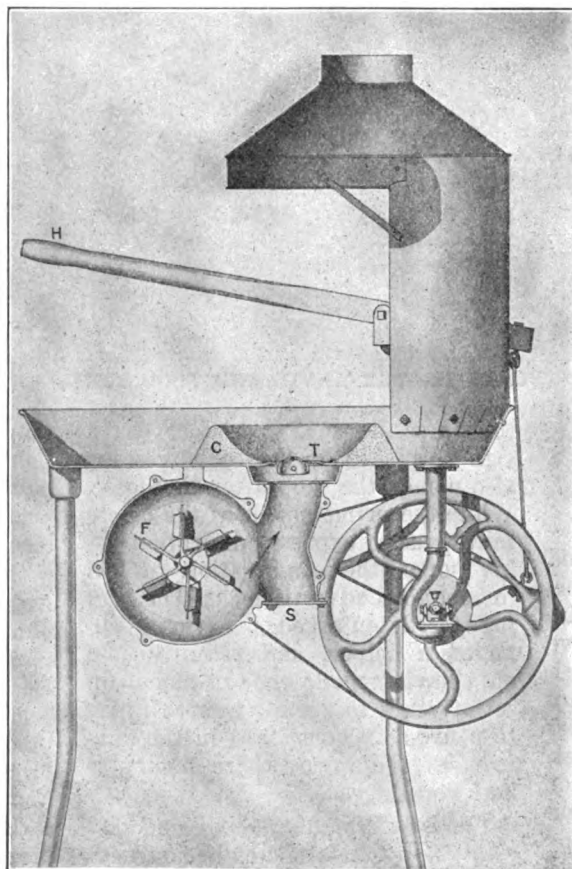


PLATE III.—SECTIONAL VIEW OF TYPICAL FORGE

soreness, contraction of the suspensory tendon, abscess of the coronet, side-bones, fevered feet, and a generally run-down condition due to the attending pain and inability to rest. Also the trouble known as Navicular Disease is purely the result of corns, and is an effect and not an original disorder.

The visible evidence of a corn is a discoloration of that portion of the sole situated between the wall and the bar. The inside of the foot is most usually effected, although there may be corns on both sides. I have never seen a corn on the outside where none were present on the inside. Rare cases occur in the hind feet.

The cause of corns is always contraction of the wall which presses against the heel of the coffin-bone. See Fig. 1; the coffin being suspended to the walls by the laminae, which is bruised and lacerated by the compression. These bruised parts secrete a blood-stained serum which permeates and colors the surrounding horn that in time grows down and reaches the exterior. The real injury has taken place one inch forward and above the surface indication.

In severe cases, where the bruise is extensive, a large part of the side of the coffin, the parts at the rear and even beneath this bone are involved. When this last condition occurs the animal is more or less a cripple for life, as not only do the lacerated tissues lose their elasticity, but the periosteum—the covering of the bones—is destroyed and ossification ensues. This is the condition that gives rise to the belief in navicular disease. There is no doubt but that bone is involved in the affection of the parts, but more so in a sympathetic rather than in an original sense.

The type of feet most susceptible to the conditions described are those of small size with thick walls and well-arched soles.

As to a distinct form of navicular disease—that is, a condition that has primarily originated on the navicular bone—I do not believe in. There are too many good reasons to disprove it. There is no other bone in structure so thoroughly protected from external injury, surrounded as it is by soft and cushioned tissues; there are no ligaments attached to it other than for its support; there is no strain or contact other than the direct down pressure of the short pastern and as offsetting this, it is suspended on the flexor tendon which in turn is upheld by the cushion of the frog. *Where affections of this bone have been present I have always found adjacent parts diseased, with all indications pointing to a prior disease.*

The primary cause of corns is faulty shoeing, and the preparation of the feet for shoeing. If the feet are prepared unlevel laterally or if the heels are too high, a ground-



work is laid for corns. In the first case, the hoof becomes misshaped from unequal distribution of weight, and on assuming a runover appearance of small size, with thick walls and well-arched soles. In nearly every case of corns the horse points the foot forward when standing and the same inclination causes him to keep the affected feet as far advanced as possible in locomotion. This is to avoid flexion, because those parts of the flexor tendon that adhere to the under surface of the coffin are involved.

In the foregoing I have endeavored to cover the conditions and general effects of what is termed "corns" and the cause of which is contraction of the lower walls of the hoof. The balance of this article will deal with side bones, which are the result of compression of the upper part of the wall. This is a malady to which flat feet are more susceptible, owing to the depression of the sole instead of, as in the foot described above, an uplifting of the same. In this latter type the lower portions of the wall have expanded abnormally and the sustaining laminae have been torn apart from their connection of wall and coffin, the sole has lost its concavity and the coffin and navicular are lower than natural. In relation to this expansion below an opposite effect takes place above and concavity occurs on each side of the hoof immediately below the coronet. The bruise ensuing is at the top of the coffin and the lateral cartilages are sufferers, for they lie between the opposing forces. This mutilation is too high for wound deposits to descend, as in the case of low compression, and

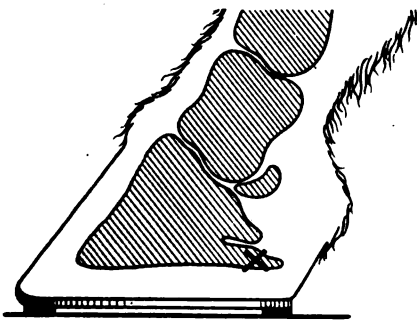
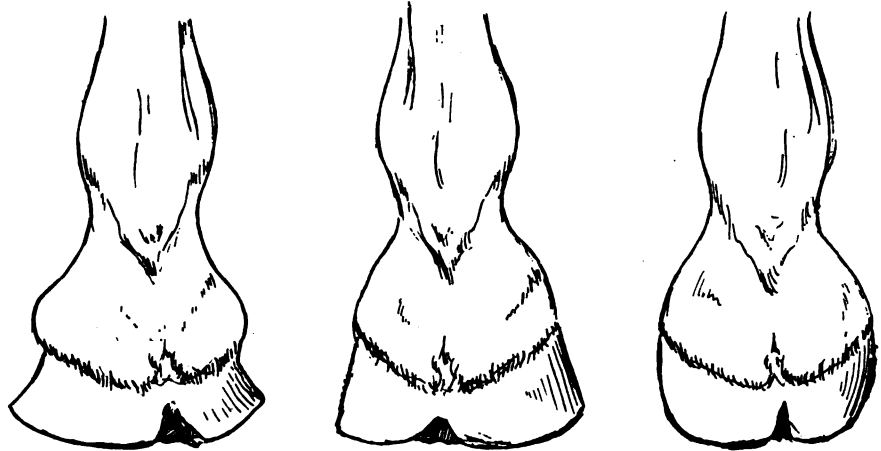


FIG. 1.—DIAGRAM SHOWING LOCATION OF CORN—SEE X

they are necessarily upward and result in the bruised cartilage's reception of bony deposits, and ossification or side bones are the fruits of this condition.

An animal may recover from corns of a mild type if conditions are favorable; such, for instance, as proper foot dressing and shoeing are

cent should be prevented. The sole should be left intact as also should the frog; as much depth of wall as possible should remain to stiffen the



(A) FOOT CONTRACTED ABOVE AND EXPANDED BELOW, WITH SIDE BONES DEVELOPED; (B) THE NORMAL FOOT; (C) CONTRACTED HEEL SUBJECT TO CORN. NOTE THE LOW CONTRACTION

practiced, or preferably, allowing the horse to run barefooted long enough for Nature to overcome the ravages of man. But once a side bone has formed, there can be no reparation because the cartilaginous parts have irretrievably lost their natural functions; and though the bony deposit is arrested, there will remain a certain amount of soreness and non-flexibility. Moreover, where side bones are present, lesions nearly always exist between the walls and sole which continuously secrete serum. This prevents a reunion of the severed parts.

It will be seen from the causes of the above described maladies that they are, although from the same fundamental cause—compression,—result in unduly contracted and expanded feet respectively, and in consequence of this diversity of form, the treatment for both prevention and alleviation of the ailments must be oppositely applied. In the case of the corn affected where the condition has resulted from the low contraction caused by the bones and other parts of the foot being forced upward, the treatment must encourage a descent. To do this the foot should be relieved of sole or frog pressure and shoes of narrow web resting on the wall only and nailed as far forward as is possible that the expansion of the foot to its utmost be allowed. With the side-bone affection the contrary is desired. This super-expanded hoof has given away to down pressure and is incapable of sustaining in a natural way its duties and therefore increased des-

foot; a wide webbed shoe with heels extending to the limits of safety should be used, and the nails should be driven well towards the heels. Pads and packing should not be used on this of all feet, for the tendency they possess for retaining moisture and thereby softening, which weakens the horn, are harmful. On the contrary dryness with the rigidity that accompanies it, will help to prevent a further development of the injury.

Without doubt calks are a necessity for security of foothold, nevertheless, they are largely responsible for the drop-sole type of feet and where possible, I heartily endorse their discontinuance. But where their elimination is impossible, let them be of modest length. The "Never Slip" type is far less injurious and equally effective, besides requiring less effort to manipulate than does the hand-produced article with heels and toes at their extremities and more than probable unequal length.

Steps in Learning to Shoe Horses Right

E. H. MALOON

In 1884 I found that I must either know more about my business or take a back seat. I had then worked for seventeen years and was considered an expert horseshoer. I could do what I thought was a mighty slick job, true and smooth, but I lacked the reason for doing so and so. My way of shoeing was simply to copy something I had already seen



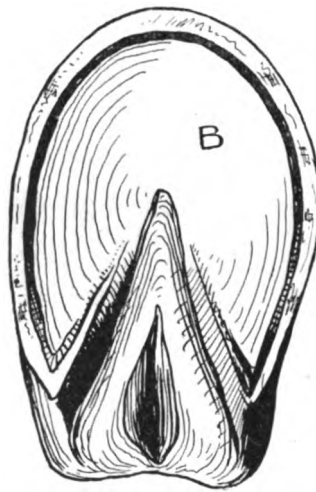
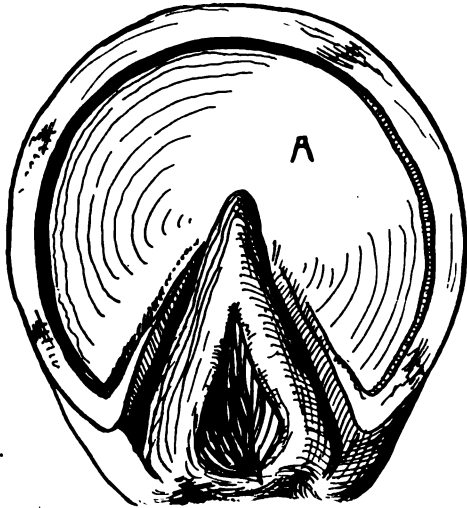
but just why it was done so I didn't know. When I really saw the need for expert knowledge, I exerted myself and by dissecting legs and feet

knowing what the results would be but found to my satisfaction that it was exactly the kind needed for this ailment.

to my competitor whenever he wanted work done. Now it was this particular customer that I wanted for myself so I left no stone unturned to get his work—short of asking for it outright.

It was sometime however before I managed to get in the wedge that was to pry away his work from my competitor's shop. It happened as follows: one of his working teams was lame, both horses.

His driver asked the owner to let him take the horses somewhere else and he came to me with one of them. The driver said that my competitor, we will call him Mr. B., said the horse had an ingrowing corn. Now this was new to me, that being the first and last one that I ever saw. Well, I told the driver I would see what I could do. I thought if he had a corn I could find it. Now Mr. B. had left the heels very high and a great growth of horn. I began to lower them thinking I could put on long heel calks to his shoes. It made the driver look wild to see the hoof come off, but I soon found the corn that Mr. B. said could not be reached. I found what I called a matterated corn just such as many horses have always had and always will have. He let hoof grow over it and called it an ingrowing corn. I dressed it after I gave it vent and put on a bar shoe that took all pressure off the sore part. Before the horse had gone his trip and got back to the shop he was better. The driver said, "I will bring his mate up and see if you can fix her." He went after her and when I saw her foot



SHOWING, (A) AN OVER-DISTENDED HOOF; (B) A CONTRACTED FOOT

and studying from books, I gradually learned just what was in a horse's leg and foot from the knee down, the work of the different parts, and the

BLACKSMITHING

I have opened up a blacksmith-shop in the S. E. Ankrom building on West High Street and will do all kinds of smithing and horse shoeing. I solicit your patronage. Emules Dickson.

THE WAY A KENTUCKY SMITH STIRS UP BUSINESS

weak points of the foot. So as I read and worked and observed it gradually dawned on me that I was up against a mighty fine piece of work—a job that would tax my brain and skill to the utmost to avoid putting the foot in a worse condition than when I found it.

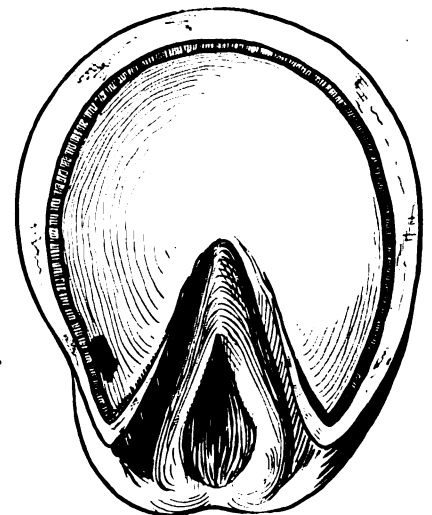
A normal foot is a fine piece of machinery and well adapted for the use for which it was intended. But man calls upon the horse for more than Nature fitted the foot to do, hence by artificial means we must help Nature to perform her natural functions to the best of our ability.

Now this calls to mind that before we had state roads, I used just as little iron as I could to protect the foot from wear. If I had a horse that was flat or thin soled, I put on a very narrow and thin bar shoe, providing, of course, that the owner would allow me to do so. Now it was this very narrow and light shoe that lead me to discover for myself how to treat over-reaching. I used it on one particular horse, not

This horse was a hard-worked livery horse and he had been brought to me to shoe for lameness. He was a natural over-reacher and after I had shod him and he had been in service for awhile, he got better. His owner came to me a little later and asked, "What have you done to old John?" He doesn't over-reach hardly any." I answered, saying, "You have got me, for I do not know." You see I had shod him for lameness, not for over-reaching.

Now this matter troubled me a great deal. I thought it over and over and finally reasoned out that I had done nothing special except put on light weight shoes. So the next time I shod him, I went a step farther and put on a heavy shoe behind. This did the deed and after that I shod him after the same fashion for several years. He simply forgot to over-reach altogether. I have no theory concerning this method. I simply present the facts concerning this case. It worked all right here, exactly fitting his case, but I learned that this general form of treatment was not a cure-all, although it has well suited many others for me since. I followed this method for years with marked success. It was one of the secrets that helped me hold my customers when I was gunning for a competitor who had moved in next door.

At this time there was a mill owner in town who ran a stock farm as a side issue. Here he raised both cattle and horses and after awhile he bought a string of race horses. For some reason unknown to me he went



INSIDE CORN AND INNER QUARTER PUSHED UP AND UNDER

I told him I could not help her until she was in a different condition. She was very thin on the sole and Mr. B. had told the driver to soak her out



in cold water and put on poultices. Now I tell you her feet were but little better than pulp. Here were too good talking points and I made the most of them. I sent the horse back to the barn and told him she would have to wait until her feet could harden up, then I would fix her so she could go. This I did by cutting out two shoes from boiler plate. These shoes covered the entire sole and fitted up close to the frog. They also fitted the sole of the front. This I did by using blue chalk on the shoe and then putting the shoe on the foot. Wherever the chalk showed bunches I removed them and finally heated my shoe red and seared the foot lightly. I next cut out a felt pad and put it under the shoe and sent the horse home. The next day she worked and they continued to use her with no more trouble until they had her killed as an old horse.

Painting the Automobile—1

From the Viewpoint of a Practical Vehicle Painter

M. C. HILLICK

A Consideration of Essential Details.

As a side line for the blacksmith or the general repair-shop manager, or as a very important part of the business, automobile painting offers not a few advantages over numerous other related activities that mechanics sometimes take up to help swell the annual volume of trade.

In taking over the business of painting automobiles the smith or general repair shop owner has a line of work that promises well for the future, the number of cars long since having mounted well up to between two and three million; which fact explains why the business of painting automobiles has grown to enormous proportions during the last half dozen years. It also explains why the smith or the general repair shop owner is likely to find it a profitable venture to take up in connection with his other shop affairs. The shop which does good work and makes itself indispensable will find its trade practically without limitations, the good roads movement having provided a means of reaching out to a distance of from 25 to 50 miles for trade. It is a very common experience for car painters to have cars coming in for painting and varnishing from across one or two counties. This is one of the sure words of promise for the man starting out in the business of car painting.

In the writer's estimation the smith and shop repairman is a logical

HORSESHOEING IS A SCIENCE

I am a Scientific Horseshoer.

SCIENTIFIC Horseshoeing is the cheapest because your horse will endure his service more satisfactorily to you.

SCIENTIFIC Horseshoeing is the cheapest because the Horse enjoys his work and food better.

SCIENTIFIC Horseshoeing is the cheapest because it prevents and cures lameness.

SCIENTIFIC Horseshoeing is the cheapest because it makes the motion frictionless, easy and smooth, and adds to speed and endurance.

SCIENTIFIC Horseshoeing is the cheapest because it requires no hoof oils or hoof ointments. Water is the best to use on horses' feet; 35 years' experience has taught me this to be true, and it will always be so.

SCIENTIFIC Horseshoeing is the safest, because a shoe on a horse's foot is an instrument of either good or ill.

SCIENTIFIC Horseshoeing is the best, because your horse will not be abused.

SCIENTIFIC Horseshoeing is the best, because it prevents sin and pain.

I cordially invite you.

Don't forget your Horse,

And my place of business.

I beg to remain Respectfully Yours,

LOUIS PETERSEN,

409 Spurgeon St., Santa Ana, Calif.

A HANDBILL USED WITH SUCCESS IN ADVERTISING THE BUSINESS OF A PROGRESSIVE CALIFORNIA SHOER

party to take over or establish a car painting business. He is in touch with practically all the other features of motor car repairing, etc., and this experience is of the utmost value to him. It offers him an opportunity to expand and make his business more extensive and important; to establish it he need not relinquish any part or volume of his present business. He simply must prepare to enlarge his enterprise, to invest greater resources, to branch out and assume enlarged responsibilities. What the venture may grow to, and the profit it may be made to yield, all depends on the man or men. If a real effort is put forth to

get business, and this business is made worth while to the car owner, then the growth of it is limited only to the size of the shop and the capacity of the working force.

The location of the paint shop is an important matter, for a number of factors are necessary to make it a paying proposition. Among these are cleanliness, light, heat and ventilation. The paint shop is always at an advantage when it is located on the top floor; here it is freest from dust and dirt. The shop should be made as nearly dust proof as mechanical ingenuity can make it, with hardwood floors and matched lumber, planed, for the ceiling and side



walls. Light is an indispensable feature; therefore, windows in plenty had best be provided through which to flood the working space with light. Light is a valuable factor in rendering the working force efficient and skillful. Provide the windows with roller curtains. For the varnish room this provision will be found especially valuable. Ventilation is another need which should be arranged for. This is a vital necessity; it is required for the physical comfort of the workmen for the proper drying of the paint and varnish, for the development of varnish lustre, and for the uniform curing-out of the various coats of material. Ventilation eliminates the poisons which infest the air of the shop and in this way effects the more uniform drying and shaping-up of the various coats comprising the finish. The heating of the shop during the cold months is also a matter of immediate concern to the painter. Some dependable heating system must be furnished. The best heat is steam or hot water. For the shop of average size, hot water will be preferable, as being the least bothersome and the least expensive. Hot air from a good furnace is better than stove heat, but neither of these systems are to be compared to hot water or steam. The heat for the apartments in which the painting is to be done should be approximately 65 degrees; that for the varnish room between 70 degrees and 75 degrees. Keep the temperature in all rooms as nearly uniform as possible. This will insure safer and more thorough drying.

A good, strong truck, built to hold a 7 passenger touring car will be needed to transport cars from one working space to another. These may be bought ready to use in various sizes, and they will be found almost a necessity; certainly great labor and time savers.

In arranging for the painting business, storage quarters for the car furnishings will be needed. Shelf room within a space that may be kept under lock and key is a safe and efficient arrangement for the storage of car accessories. Each car as it comes in to the shop should have a shop number or letter and under this designation the car and its parts should be carried while it is in the shop. This department of the shop should be put in charge of some dependable, careful man, who must be responsible for the safe storage of the furnishings.

The question of tools for the shop

is a foremost one; good tools should be had. There is no economy in starting out with an inferior assortment of brushes and other working equipment. Indeed, these need to be of the best, regardless of price. Brush keepers, both for varnish, paint and color brushes, had best be furnished. The proper storage of the brush equipment has very greatly to do with the life of the tools; the same is to be said of the other tools used, such as paint burners, putty knives, scraping knives, container openers, paint mill and many other implements used in the work. Wash leathers, sponges, pails, water brushes, etc., need to be kept

Lester C. Kurtz GENERAL BLACKSMITHING

Horseshoeing and Plow Work
a specialty.

Repair Work of all kinds done on
short notice. Electric Machinery.
Prompt Service.

FRONT ST. LEMOORE

**A LIVE CALIFORNIA SMITH KEEPS
HIS NAME AND BUSINESS BEFORE
THE PUBLIC BY ADVERTISING
LIKE THIS. THIS APPEARED
IN A LOCAL NEWSPAPER**

in a locker or closet clean and free from dust.

The brush equipment, to start with, may be selected to contain 1/2 dozen oval, bristle paint brushes with which to apply paint and rough coats; 1/2 dozen flat, double-thick camel's hair brushes, 2 and 2 1/2 inches wide for the application of color coats; a set of rubbing varnish brushes consisting of one 2 inch, flat, half-elastic bristle brush; one 1 inch flat badger hair brush. The finishing brushes may consist of one 2 1/2 inch, full elastic, flat bristle brush, one 1 inch bear's hair brush, and a 2 inch, full elastic, flat bristle brush. This finishing set of brushes will serve to take care of almost any size of surface likely to come along. For the chassis the color brushes should be from 1 inch to 2 inch, flat camel's hair, with badger hair brushes from 1 inch to 2 inches for the varnish work. These badger hair brushes are also needed for the

application of varnish-color. Some other sizes will perhaps be needed as the business goes along and the actual requirements disclose themselves. However, those above given will meet the needs of any business, great or small, for the most part. The dusters had best be the white bristle ones, both oval and flat. Buy the brush equipment strictly upon its merits, regarding quality as the main thing, regardless of price. In this matter the ultimate cost is the one thing that needs to be kept in mind. What has been said here relative to quality being the supreme consideration in choosing brushes, will apply with equal emphasis to the choice of paints, color and varnish. The automobile equipment is exposed to a very severe form of service, and only the fittest has a chance of surviving for a reasonable term of wear, hence quality, above everything else counts for most.

The shop owner may desire to know about what amount and kind of material is used in the painting of, say, a seven passenger touring car. Allowing for the variation in the strength and covering power of the different pigments, the approximate quantities will be as follows, computed upon the basis of new work and including all parts of the car:

Priming	3/4 gallons
Roughstuff	2 1/2 gallons
Putty	1 pound
Sandpaper	18 sheets
Color	2 1/2 quarts
Varnish-color	3/4 gallon
Rubbing varnish	3/4 gallon
Finishing varnish	3/4 gallon
Rubbing stone	3 pounds
Pulverized pumice stone	3/4 pound
Turpentine, (all purposes)	1/2 gallon
Crude oil, for cleaning	1/4 gallon
Gasoline	1/4 gallon
Raw linseed oil	1/2 gallon
White keg lead, ground in oil....	1 pound

In the painting of a berline or a landaulet the above quantities should be increased fully one-half; for a limousine, one-third; coupe, one-fourth; sedan, one-half. These are, of course, approximate figures. The average 4 passenger touring car will require about one-fourth less material; the runabout, one-third less.

The wear and tear of brushes and other tools, rental, light, heat, advertising, collections, and certain other expenses, overhead and otherwise, may be reckoned at 7 per cent. The cost of labor, at the present rate of compensation, will be practically 75 per cent. Some owners of paint shops find it profitable to keep a



close check upon both labor and material items, and in this way, in due time, they are able to get a very close average cost of doing the several classes of work. This will require some extra book-keeping, but business today cannot be conducted without a good system of book-keeping; it is the pulse of the enterprise. It is the detector of irregularities. It draws the line between profit and loss. In a word, it is the sum of the whole matter. A careful estimate should be made of all work before it is contracted for. All items of work, from the least to the greatest, should be accounted for. A schedule of processes should be arranged for each individual car as it is taken in, and these processes should be uniformly adhered to; every job will need to be finished on time. Promptness is a wonderful help in getting new business.

How a Blacksmith Made the Plow that Conquered a Wilderness

Put yourself for awhile in the place of John Deere, young blacksmith, giant in stature and strength, owner of a little blacksmith shop in the little frontier village of Grand Detour, Illinois, in the year 1837.

Around you stretching in every direction are illimitable prairies and muck-lands, black of soil that extends down nearly as far as a man can dig in a day. Rank vegetation covers the land, growing on hot July days so fast that you seem to see and hear the growth.

Around you, too, are scattering farmers—hardy pioneers, among the first to press westward from New England and the Middle Atlantic states—who have stopped here attracted by the promise of this land of wonderful fertility.

But there is gloom in the community. There is talk of resuming migration westward in search of a different soil, or of return towards the land from whence you and the farmers came. For the rich, black, gluey soil rebuffs every type of plow in use. The farmers are unable to put in crops.

There are frequent consultations in your little shop. The farmers know that you are a good blacksmith, and they look to you for a solution of the problem.

You tinker skilfully with the plows that they bring in—plows of wood with iron-tipped shares and iron-patched moldboards. They are

the best plows the world has yet developed; they were serviceable in light soils back home in the East; but here in this wonderful new



land of locked soil-treasure, they fail in spite of all that you can do with them. Experiment follows experiment in your little shop; but still the problem remains unsolved.

Then one day a new idea develops in your mind, telling you that the necessary plow must have a steel moldboard and share, with the moldboard curved in such a way that it will scour itself as it works in the gluey soil.

No plow of the kind your imagination sees has ever been built. You have no pattern to follow. Painstakingly you carve a pattern on a log, carefully fashioning the curve that means everything.

Then, since you have no other steel, you cut a piece from an old mill-saw blade, dimension it exactly to fit your purpose, place it over the pattern and carefully hammer it with a wooden mallet until it fits the pattern lines.

Your plow bottom is done—the first of its kind ever built.

You bolt your creation to a frame that you have fashioned from white oak rails, shoulder the assembled plow and go to a nearby farm for a demonstration.

A crowd of farmers look on—some cynical, some hopeful—while you hitch a horse to the plow. You make a few final adjustments, cluck to the horse, lift up on the handles of the plow, and then, while the horse plods on and the farmers gasp, the thing which you have created voices a low, continuous whisper as the black, gluey furrow-slice turns clean and true from its moldboard.

Your plow has solved the problem.

It was thus that John Deere planned, built and demonstrated the world's first successful steel plow, launched his long career as the master maker of farm implements, and unlocked the treasure-hold of the world's greatest agricultural region.

The hungry world is turning landward. The plow-maker is coming into his own. And the world gives special credit to the sturdy blacksmith who evolved a new plow that conquered a wilderness; that leads in the work of producing food for the world.

—Courtesy Deere & Company

When is a Partner Entitled to a Salary?

RALPH H. BUTZ

It frequently happens that when a partnership is entered into each one of the partners is under the impression that he will receive a salary for his services; these salaries to be in addition to the distribution of the profits. But in most instances the articles of agreement do not provide for the partners' salaries, each partner thinking that no agreement is necessary for such a purpose, as it is an easy matter to draw a salary. This attitude is due to the fact that the average business man believes he can fix his salary when he is in a managerial or executive position, and that if any of the partners object to his reasonable demands, that he can enforce them.

The fallacy of this idea was very well illustrated in a case decided quite recently. Jones and Wilson were co-partners and conducted a small manufacturing business. Both partners made an equal investment in the business. Mr. Wilson had charge of the business and devoted his entire time and energy to it, while Mr. Jones was interested in other enterprises that occupied his time and attention. Wilson received a salary of \$25.00 per week as manager of the business, and he also received fifty per cent. of the profits on account of his investment in the business. These two conditions were specified in the partnership agreement.

After the business had been in operation for one year and had proved a profitable venture, Jones, the "dormant partner," also demanded a salary of \$25.00 per week, and ordered Wilson to pay him this salary at regular intervals. Wilson



refused to authorize the payment of salary to Jones, stating that Jones was not entitled to a salary because he was not active in the business,

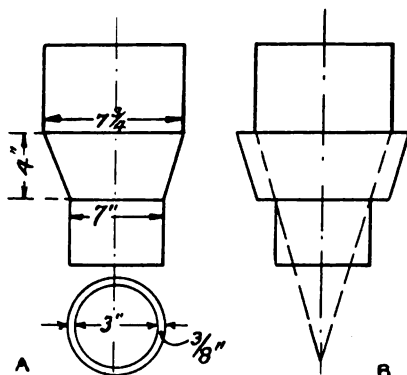


FIG. 1.—(A) THE PIPE IN QUESTION. (B) SHOWING TAPERED BAND FITTED OVER IT

and also because the articles of agreement did not specify that he was to receive a salary. The Court upheld Wilson because when a partner performs services for the co-partnership he can not collect pay for such services unless there is an agreement to that effect.

Thus it is plainly evident that unless partners have an agreement in which is set forth the salary each one is to receive, it is an implied condition that the time and work expended for the benefit of the co-partnership is to their mutual advantage, and that their compensation must come in the form of profits earned by the business.

However, when an agreement is entered into it is usually upheld, although a modification of the agreement may have been consented to by one of the partners. But when the reason for such modification no longer exists, then the original agreement is construed as being again in effect. An example of this principle may be had in the case of Haret vs. Colum. Haret was to receive \$80.00 per month and did receive this amount through several months. Then the firm moved into a building owned by Colum, and it was agreed that Haret would not draw a salary and that Colum would furnish the building free of expense to the partnership. Several months later the firm again moved, and in the new location paid rent. Haret again demanded his salary. Colum refused this request, stating that Haret had consented to a modification of their agreement under the terms of which he had consented to dispense with his salary.

Haret started suit and the Court upheld his claim, saying: "In the absence of an agreement one partner can not collect pay for services performed for the co-partnership. Each partner is supposed to devote his time, skill and endeavor to the partnership business, and this without compensation other than his share of the profits. But it does not follow that the Court is precluded from taking into consideration all the surrounding facts and circumstances of the case, the course of dealing between the partners, the reasonableness or unreasonableness of the claim made, the probabilities arising out of the business in determining whether such agree-

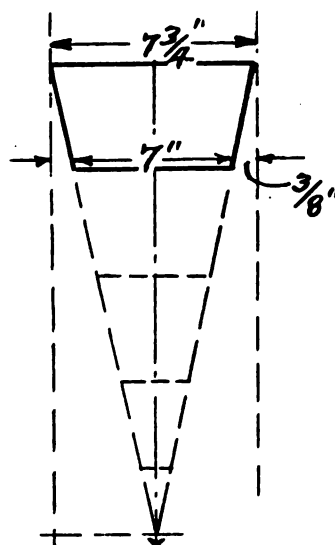


FIG. 2.—EXTEND TEMPERING SIDES TO FIND THE RADIUS

ment exists. It is admitted that originally there was an agreement for compensation. The reason for its modification was the furnishing of the building, light and heat, by Colum. It is admitted that after they moved to their new location these were not furnished by Colum. It is admitted that the business was a prosperous one; that, in addition to paying off the loan for the purchase price, each partner received \$1,000 in cash as his share of the profits, and they had several thousand dollars of firm assets on hand.

"If the suspension of Haret's compensation was only to continue until they got on their feet, it is apparent that the time had arrived \$2,000 profit on a \$1,300 investment. If the reason for the suspension of when they were able to draw out that compensation was that Colum was furnishing rent, light and heat, that reason ceased when they moved out of defendant's building."

It is always advisable to have the partnership agreement state whether each partner is to devote his whole time to the business, and the salaries to be paid to the various partners for their services, otherwise there is always a possibility that disputes will occur which might have been avoided.

While a partner can be enjoined from engaging in a competing business whether there is an agreement or not, it is not possible to keep him from engaging in any non-competing business if there is no agreement that expressly states this fact, unless it can be proven that he is neglecting the business of the partnership, and this is a difficult thing to do in most instances.

Calculating Stock for Forgings

WM. H. OST

How to calculate the mount of stock for a tapered band or collar to be shrunk on a tapered pipe

The question often confronts the smith when working from a blue print: How much edge bend shall I give a bar of iron so that when bent on the flat side it shall have the required "dish"? The following calculations may be applied to many other problems requiring "dish".

Since the diameter of the pipe diminishes $\frac{3}{4}$ " in 4" (4" the length of the taper), to reach the point, or the radius (Fig. 2) it will require as many as of these 4" sections as 4 is divisible by $\frac{3}{4}$; that is, 4 divided by $\frac{3}{4}$ and the result

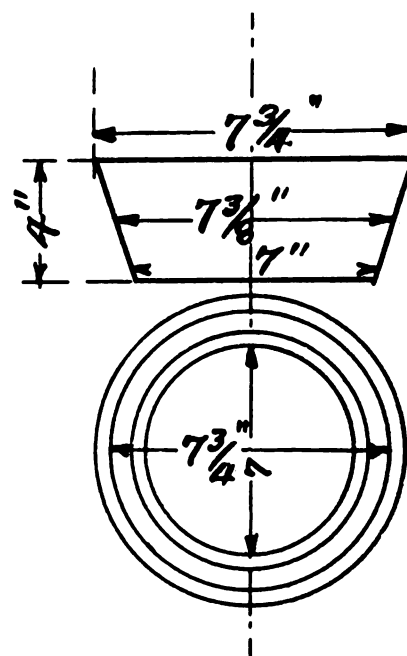


FIG. 3.—ESTIMATING THE STOCK FOR BAND



multiplied by 4 is equal to $21 \frac{1}{3}$ ", or the radius.

To estimate the stock for band, take the mean diameter (Fig. 3) which is $7\frac{3}{8}$ " ($7\frac{3}{4}$ " plus 7 " divided by 2" equals $7\frac{3}{8}$ ") and add to this once the thickness of band ($\frac{3}{4}$ ") and multiply this by $3 \frac{1}{7}$ ($7\frac{3}{8}$ " plus $\frac{3}{4}$ " multiplied by $3 \frac{1}{7}$ " equals $25\frac{5}{8}$) to which may be added $\frac{1}{2}$ of the thickness of the iron as allowance for welding, making 26" the required stock.



Odd Mention of Anvil Ringers and Knights of the Forge in the News of the Day

Daughter of Blacksmith Heiress to \$150,000
Miss Elizabeth A. Huther, who is about to marry her former guardian, is heiress to an estate of \$150,000 left by her father, a blacksmith of Poughkeepsie. The latter lived in seclusion and neighbors believed him to be poor.

20,000 Conscripts to Learn Horse Shoeing
Twenty thousand members of the national army will learn horseshoeing under expert craftsmen selected by the Master Horseshoers' Association of Massachusetts by a plan proposed at their annual convention. With the consent of the War Department, the association will pay the difference between the \$51 wage of the enlisted instructors and the civilian wage schedule.

Village 'Smithy' Gets Exemption to Aid Farmers

The village "smithy" in the Town of Granville Center, Wis., is indispensable to the harvesting of crops, according to the ruling of the appeal board, which has allowed Peter N. Hacker of that town a temporary discharge from military service. He was given exemption until Jan. 1, 1918, on agricultural grounds.

Mr. Hacker shoes horses and repairs farm machinery of all kinds and conducts the only shop of its kind in the community. Secretary F. H. French said the board held this is an important community industry necessary in the harvesting season.

Miners Refuse to Accept any Orders for Smithing Coal

Blacksmiths and large industries that use a grade of coal known as "smithing coal" are now in the "I-should-worry" class.

This was made clear in a letter received by Blacksmith Harry Martin, of New Castle, Ind., from the mines in Pennsylvania where he has purchased this coal for some years. In reply to an order for a car of smithing coal the firm wrote that it could not be furnished since the coal is classed bituminous under the President's recent order, and the price at the mines fixed at \$2 per ton, which the letter stated, is not half its actual cost to them.

For some months past Mr. Martin said, he has been paying \$5 to \$5.50 for this coal. The Maxwell factory is a large user

of this coal, requiring several tons a month. This particular firm referred to wrote that so soon as accepted orders are filled they will close the mines until such time as the order of the President may be amended or rescinded.

Mr. Martin stated further that the stocks of this kind of coal in the hands of dealers are evidently very low, as blacksmiths from many places have been driving long distances to New Castle to get a supply.

Blacksmith Shop Stolen.

The police of Springfield, Mass., are on the lookout for whoever toted away a whole blacksmith shop, the property of Contractor Carl B. Lindholm. The shop was an outdoor affair and included a forge, anvil and accessories and is valued at several hundred dollars.

Utica, N. Y., Association of Horseshoers Raises Prices

The Utica Master Horseshoers' Association met recently and decided to raise the price of drive calk shoes, all sizes, to \$6 a set of four, calks to six cents each or \$3 a box of 50, extractors to \$75 each and the resetting of patent shoes to 40 cents each. The high cost of materials makes this action necessary.

Blacksmiths Have Formed a Trust

Keeping pace with the high cost of living the Urbana (Ohio) blacksmiths are the latest class to raise prices and the local smiths have recently announced an increase in the price of all forms of horse shoeing.

Instead of paying the old price of \$1.50 for having a horse shod all around with four new shoes the price is now \$1.75. This is for light shoes and light road horses. For heavier horses and heavy shoes the price is \$2.00, this being a 25 cent raise. For the heaviest shoes the price will be \$2.25.

The prices for resetting, toeing, and repairing of shoes has also advanced. The price is now \$1.00 for the small size shoes while for the larger ones it will be \$1.20 and \$1.40. This is a small raise. Pads will now cost 50 and 75 cents but side calks will remain at the old price of 5 cents each. Neverships and drive calks which are used largely in the winter time have also gone up. They will now cost three, four and five dollars per set, depending on the size.

In spite of the fact that automobiles are now so very common the local blacksmiths report that business has been extremely good this season. The only mistake they have made this year, they say, is that they did not raise the price in the spring. That the business has kept up so well is due to the fact that not as many men are going into the business now as formerly.

U. S. in Need of More Forest Battalions

The forest service has been requested by the engineer corps of the war department to assist in organizing ten more battalions of foresters and lumbermen to be known as the Twentieth Engineers (Forest) regiment. One regiment of the Tenth Engineers (Forest), now known as the "Lumberjack regiment," has already been fully organized, and it is said will soon be actively engaged behind the lines in France in woods work incidental to the operations of the allied armies. There is immediate need for two more battalions and ultimate need for ten, each battalion to consist of three companies of 250 men each.

Until further notice, the classification of men listed will include among others the following: blacksmiths, motor truck operators, motorcycle operators, teamsters, sawmill hands, woods hands, horse-

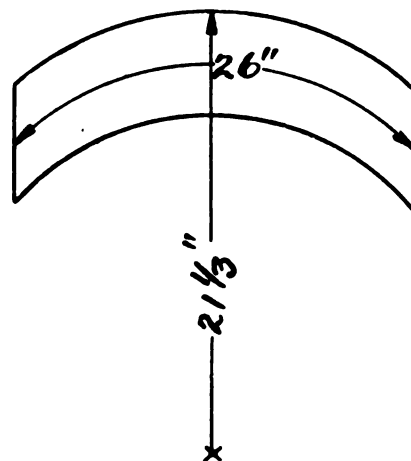


FIG. 4.—SHOWING DIMENSIONS OF RADIUS AND THE REQUIRED AMOUNT OF STOCK FOR THE EDGE BEND

shoers and harness makers. Recruiting cards and letters explaining the conditions of enlistment will be furnished by the forester at Washington.

Blacksmiths Needed by Marines for Service Abroad

Uncle Sam's "Soldiers of the Sea" are in urgent need of horseshoers for early overseas service, according to information received from the United States Marine Corps. Single men not drawn in the draft will be enlisted and at once advanced to the rating of sergeant. They will be assigned to Quantico, Va., where the next expeditionary force is now in training.

To Plan War Efficiency

Business agents of the locals in the United States and Canada of the International Brotherhood of Blacksmiths and Blacksmiths' Helpers' Union will hold a series of conferences in Boston shortly. The object of these conferences will be to promote the interests of the members and work out plans for giving the government even greater efficiency during the war. This announcement was made at a meeting of Local 105 by Fred C. Bolam, international vice-president, who has just returned from Washington.

During his address Vice-President Bolam explained the wage increases granted by the government to mechanics employed in the navy yards and arsenals of the country and was listened to with marked attention by the members employed at the Boston navy yard and the Watertown arsenal.

California Blacksmiths to Organize

First steps were taken at a meeting held in Porterville, Cal., of the owners of blacksmith shops, for the establishment of an organization which will stabilize prices, standardize work and protect the trade against slow-pay and delinquent customers. It is hoped eventually to extend the organization to all towns of the county to make prices uniform over the large territory.

Two of the five owners of such shops here are women, and it is due to their initiative that the organization was started. New prices went into effect September 1.



The Village Smithy

Lines set to a familiar meter by B. J. PAULSON, Helena, Mont.

Under a spreading chestnut tree,
The village smithy stands;
The smith, a mighty man is he,
With tractors on his hands.
And the muscles of his iron steeds
Are as strong as horses eight.
They are built to meet the farmer's
needs
And to work from morn' till late.

Week in, week out, from morn till
night,
You can hear the tractors chug;
You can hear them bark with main
and might,
With measured beat and smug.
Like the farmer clinking silver
dollars,
When the harvest's safe and
snug,
And no one hears the landlord's
hollers,
Because out here there's no such
bug!

—The Harvester World.



Heats, Sparks, Welds

What is the use of having an aim in life, if you fail to pull the trigger?

Remember the Second Liberty Loan. If you are not fighting on the Front, buy a bond.

Keep that smile a-working—it won't take long for it to outdistance that frown.

Collections are a debt every man owes his business.

It is the job well done that costs the least in the long run.

You can lead a boy to college, but you can't make him think.

Persistence usually wins out. Just keep everlastingly after those slow pays.

It's the sort of faith that enables man to eat hash that's needed these days.

Too many men turn down paying jobs for reform work that doesn't net them a red cent.

Drink is about as useless for drowning

one's troubles as fire for quenching burning gasoline.

It isn't always the obvious that works. Ferinstance: it's not the sharp smith that does the price cutting.

Someone mentioned t'other day the H. C. of L. Now we're wondering if he didn't mean the Hellish Cost of Living. What?

Safety in the smith shop is a topic of ever-increasing interest. Have you any ideas along this line? If so, send them in.

Are you one who never apologizes? The knack of yielding a point now and then is an invaluable business asset and worth while cultivating.

A good scheme in making collections follows: after you have sent your customer a bill and received no response from him, just ring him up on the phone. Try it an see how well it works.

Here's an old one, but it's one we can all profit by, so let's have 'er again: "Consider the postage stamp, my son; its usefulness consists in its ability to stick to one thing until it gets there."

Selling something on the side is good business for the smith. It keeps the H. C. L. within easy reach and is an excellent balancer when trade begins to fall off on account of the season or other cause.

We hear a lot these days about it being easier to keep a horse in good condition than to strengthen him after he's lost his health. You can apply the same line of reasoning to your business. Think it over.

Do you complain about getting nothing but the cheap jobs while your competitor gets the well-paid ones? Maybe the cheap ones are the kind you go after. Folks usually get what they seek in this world.

Friends are a necessity in business as well as socially. Make customers of your friends and friends of your customers. It's the friendly feeling that helps business along and keeps the shop hustling and merry.

The successful blacksmith is he who can and will make use of the tried and tested experience of others. It is he who has the courage to discard his own errors and profit by the truths of other men in the business.

A side line is fine in its place—but keep it there. Don't let your good customer bring in his horse to be shod and find all hands grinding feed, making cider or sawing up logs when there's regular business to tend to.

Opportunity usually comes to the first grabbers. How about you? Going to let some wise guy from other parts come into your village and start up a profitable auto business that is yours by rights? Better get busy then.

If your competitor talks about you, better put him on your pay roll. You know that old one—"Every knock's a boost." It is as true today as ever and every word your competitor lets fall about you is an advertisement for your business.

It won't take more than a minute to sit down and write up an interesting item about that job you did last week. Others will find as much of interest and value in your hints and kinks as you find in theirs. Better let the Editor hear from you today.

Every month sees more and more of our readers taking advantage of the special long-term rates and putting their names on Our Honor Roll. As a shrewd business

Proverbs of Solumn

VERILY I say unto you, O brothers: in union there is much strength, and in the upholding of good prices and credit rules there is much profit.

The foolish smith ignoreth the teachings of experience; but the wise smith profiteth thereby.

The foolish smith cusseth mightily when a customer taketh a job to his competitor; but the wise smith singeth a little louder and getteth another one who is better pay.

—Will Bishop.

investment you can't beat it! Ask any one of the men whose names are on the Honor Roll.

Iron is still on the ascent as far as price goes. And due to the scarcity in supply, scrap is in more urgent demand than ever before in history. It's a good time to get rid of that unsightly scrap pile and add a few welcome kopecks to the account in the bank.

Here's a bit of appreciation that does our hearts good: "I cannot get along without the good old friend of mine any longer. Enclosed find remittance and please send my paper right along." And this from another old reader: "She's a good one, keep her coming."

Uncle Billy Martin seems to have the right idea when he says: "I'd rather trust that man who never seen the inside of a church but who allus walks his horses uphill, than the chap who reads the Book all week and trots his horse all the way up on a hot day."

Old Man Cal Amity Howler says. "The automobeal an' them thar tractors is goin' to be the death o' smithin'. Thar ain't goin' to be no hosses for the smith ter shoe an', thar ain't goin' to be no wagons for his tire shrinkin' ability ter practice on. So I guess it's 'bout time ter git back t' the farm agin, while the gittin's good."

Keeping up with the season also applies to collections. Now's the time to get after those farmer customers of yours. Harvest is over, money is stowed away in the bank, and it's simply up to you to collect. Get busy—push those old accounts, go about it more persistently than ever, withal using a necessary amount of tact.

You cannot run your business on the money in your debtors pockets. And your efforts and work will not do you or your family and good unless you get the money that belongs to you. Clean up the old accounts—go after them tactfully, persistently and thoroughly. If necessary, sue for your money, and then start with a clean slate and keep it as clean as you can.

It's the right sort of a man who will learn from a ten-year old boy—if the boy knows something that the man does not. It's more the knowledge than the source that we care about. Next time your helper tries to give you an idea, don't tell him to go to blazes—listen to him, encourage him to think up more ideas—and first thing you know, the kid may spring one on you that will put dollars into your pocket.



Our Honor Roll

AS GOOD AS A BOND!

That's what one reader says about his long-time subscription. It is an investment that pays for itself over and over again. Interest is paid monthly—and at a liberal rate—for every issue of "Our Journal" that is read by you adds just so much to your stock of craft knowledge. One could not ask for better security for his money. The "Blacksmith" is no new thing; it is an established craft institution. Then the conversion privilege is a feature worth considering. If you die before your subscription has expired, your family receives the balance due you at your death.

A long-time subscription is an investment well worth your thoughtful attention. Read the rates below. Notice how much actual cash you can save—and get busy today.

WHO'S GOING TO PASS "PASS"?

Mr. H. E. Pass, a husky iron wallower from Minnesota, made as fine a showing in the ring last month as T. R. would in Germany. He's ready for all comers—light-weights, middle-weights, thin ones, tall ones, fat ones, slim ones—BUT, it'll take a powerful punch to "get him." Who's next?

U. S. and Mexico Canada Other Countries.

2 yrs.....\$1.60 and save \$.40.....\$2.00 and save \$.50.....10 sh. save 2 sh.
3 yrs.....2.00 and save 1.00.....2.70 and save 1.05.....14 sh. save 4 sh.
4 yrs.....2.50 and save 1.50.....3.20 and save 1.80.....18 sh. save 6 sh.
5 yrs.....3.00 and save 2.00.....3.75 and save 2.50.....1 £ save 10 sh.
10 yrs.....5.00 and save 5.00.....7.00 and save 5.50.....1 £ 14 sh. save 1 £ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving, the more you save. There is no better time than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
H. E. Pass, Minn.	Dec., 1941	P. Nelson, Minn.	Dec., 1925
E. A. Krebbiel, Kans.	May, 1937	M. Kennedy, Tas., Australia	Dec., 1925
The Fix-It Shop, Utah	July, 1935	H. Jones, England	Dec., 1925
J. A. Torray, Mass.	Dec., 1933	A. J. Wassmuts, Idaho	Nov., 1925
W. C. Watt, Kansas	Dec., 1930	J. G. H. Mallett, Queens, Australia	Nov., 1925
C. J. Vanblad, Pa.	Mar., 1929	A. W. Speir, Ohio	Nov., 1925
I. J. Stites, N. Y.	Jan., 1929	W. R. Clepper, Texas	Nov., 1925
A. J. Brookman & Co., Aust.	Sept., 1928	G. H. Isley, Mass.	Nov., 1925
Waddington Farm, Va.	Mar., 1928	L. Krause, Ind.	Oct., 1925
A. MacLean, Ont., Can.	Feb., 1928	Reynolds Brothers, Pa.	Sept., 1925
Plateau Shoeing Shop, Colo.	Dec., 1927	F. W. Krens, Calif.	Aug., 1925
W. A. Wilson, N. Z.	Sept., 1927	C. E. Allen, Nebr.	Aug., 1925
F. C. Beck, Nebr.	Aug., 1927	A. E. Spangberg, Oregon	May, 1925
W. W. Egly, Pa.	June, 1927	D. M. Kile, Okla.	Apr., 1925
C. Stebbins, Jr., Kansas	May, 1927	G. Gullgren, Iowa	Apr., 1925
J. Bremmen, Va.	May, 1927	G. Fredericks, Minn.	Mar., 1925
S. Forman, N. J.	Apr., 1927	V. Friesmuth, Wisc.	Mar., 1925
H. Dyresen, S. D.	Apr., 1927	E. Price, Illinois	Feb., 1925
G. Shoemaker, Pa.	Mar., 1927	D. C. Garber, Ohio	Feb., 1925
C. Geiger, Penn.	Mar., 1927	J. H. Kurk, Illinois	Feb., 1925
F. Evans, Conn.	Mar., 1927	E. R. Hiteshue, Ohio	Feb., 1925
P. Flanagan, Cal.	Mar., 1927	H. F. Schreiber, Pa.	Feb., 1925
J. Peterson, Iowa	Mar., 1927	S. J. Damm, Iowa	Jan., 1925
A. Tillman, Calif.	Feb., 1927	J. M. Withers, Hawaii	Jan., 1925
J. W. Haught, Ill.	Feb., 1927	D. Teeblen, Nebr.	Dec., 1924
F. Roschy, Pa.	Feb., 1927	N. B. Quick, Pa.	Dec., 1924
J. W. Howes, Md.	Feb., 1927	F. H. Jarvis, Indiana	Dec., 1924
W. Stocker, Texas	Feb., 1927	George Tatum, Jr., Fla.	Dec., 1924
W. Ponthus, Iowa	Feb., 1927	I. Clark, Va.	Dec., 1924
M. Goller, Pa.	Feb., 1927	A. N. Estes, Va.	Dec., 1924
A. A. McLean, Nev.	Feb., 1927	J. Bailey, Manitoba	Dec., 1924
C. M. Adams, Conn.	Jan., 1927	E. G. Naylor, Md.	Dec., 1924
C. Radeleff, Iowa	Jan., 1927	Halvorson Brothers, S. D.	Nov., 1924
P. J. Kanth, Ill.	Dec., 1926	P. Schicks, Washington	Nov., 1924
A. H. Gooding, S. Aust.	Dec., 1926	H. E. Snyder, Oregon	Nov., 1924
H. Pass, Minn.	Dec., 1926	J. A. Stewart, Ky.	Oct., 1924
A. Granadam, Ill.	Dec., 1926	C. Richenecker, N. Y.	Oct., 1924
C. J. Hale, Wash.	Dec., 1926	W. L. Bertholf, N. J.	Oct., 1924
John H. Schneider, Cal.	Dec., 1926	J. W. Hewson, S. Africa	Sept., 1924
J. C. Smith, Washington	Dec., 1926	Ed. Larson, N. D.	Sept., 1924
H. Griman, Utah	Dec., 1926	W. T. Monk, Illinois	Sept., 1924
F. Harding, Iowa	Dec., 1926	W. T. De Young, Illinois	Sept., 1924
F. L. Mattocks, Ark.	Sept., 1926	C. W. Taylor, Pa.	Aug., 1924
B. B. Jones, Wisc.	Sept., 1926	Charles Wells, Colorado	Aug., 1924
J. Taylor, Calif.	Oct., 1926	H. G. Weaver, Pa.	Aug., 1924
W. H. Branch, N. C.	Oct., 1926	Working Men's College, Vict.	June, 1924
J. Clarke, Jr., Queens, Aust.	Aug., 1926	F. M. Kenoyer, Nebr.	June, 1924
I. Boles, Ohio	July, 1926	O. Anderson, Ariz.	May, 1924
J. A. Buchner, Mich.	July, 1926	R. C. Frederick, N. D.	May, 1924
H. Mitchell, N. Y.	July, 1926	H. L. Fenton, New Mexico	May, 1924
M. Broton, N. D.	June, 1926	J. Carl, Iowa	May, 1924
A. Schmitt, Nebr.	June, 1926	J. E. Little, Pa.	May, 1924
D. Ackland & Son, Man.	May, 1926	H. I. Brenzle, N. Y.	Apr., 1924
H. Pirret, Ore.	May, 1926	W. E. Parr, Iowa	Apr., 1924
J. Stinclair, W. Australia	May, 1926	F. Sramek, Nebr.	Apr., 1924
P. Sowa, Oregon	May, 1926	L. A. Hulen, Calif.	Apr., 1924
E. P. Dignan, S. Australia	Apr., 1926	J. E. Ray, Minn.	Mar., 1924
P. A. Peterson, Iowa	Apr., 1926	A. Hulstrand, N. D.	Mar., 1924
G. F. Bowers, Okla.	Apr., 1926	W. F. Seibert, Calif.	Mar., 1924
W. Pocheu, Oregon	Mar., 1926	P. F. Seibert, Calif.	Mar., 1924
A. Garver, Ohio	Feb., 1926	H. Roeschewetter, Mo.	Mar., 1924
C. Burton, Mass.	Mar., 1926	W. B. Briant, N. J.	Mar., 1924
J. Murphy, Calif.	Jan., 1926	A. Bosch, N. Y.	Mar., 1924
J. F. Murphy, Nev.	Jan., 1926	D. Van Valkenburg, Mass.	Feb., 1924
F. Kearnes, Illinois	Jan., 1926	A. R. Johnson, R. I.	Feb., 1924
J. M. McIntire, Pa.	Jan., 1926	F. Jacobs, Ohio	Feb., 1924
W. Post, N. Y.	Jan., 1926	A. J. Ferry, Illinois	Jan., 1924
Powell Brothers & Whitaker, Eng-land	Jan., 1926	E. K. Walker, Calif.	Jan., 1924
O. Tompkins, Idaho	Jan., 1926	H. D. Erskine, Vermont	Jan., 1924
N. Karolowicz, S. Dak.	Jan., 1926	E. Fowler, Pa.	Jan., 1924
E. L. Linn, N. Y.	Dec., 1925	Breen & Son, Ireland	Dec., 1923
E. A. Hulway, Illinois	Dec., 1925	M. Lamoureux, Ohio	Dec., 1923
Williams & Turner, W. Va.	Dec., 1925	C. R. Davis, N. Y.	Dec., 1923
J. J. Devine, N. J.	Dec., 1925	F. W. Copeland, Kansas	Dec., 1923

NAME	Subscription Paid to	NAME	Subscription Paid to
J. L. Tomlin, Kansas	Dec., 1923	J. Boyer, Mich.	Dec., 1921
H. A. Davis, N. Y.	Dec., 1923	C. F. Shaw, Man., Can.	Dec., 1921
E. H. Troyke, Illinois	Dec., 1923	W. Blaker, Ohio	Dec., 1921
D. B. Johnson, Iowa	Dec., 1923	W. Lamberton, N. Y.	Dec., 1921
J. M. Karer, Ohio	Feb., 1923	Schedley & Schmitt, Pa.	Dec., 1921
S. Horton, Calif.	Nov., 1923	O. Furry, Kans.	Dec., 1921
J. Spratt, Mass.	Nov., 1923	E. A. Pierson, Okla.	Dec., 1921
F. Watkins, N. H.	Nov., 1923	J. Robertson, Scot.	Dec., 1921
F. Koppnis, Ala.	Nov., 1923	J. Lauer, Mo.	Dec., 1921
Y. C. Lienert, S. Australia	Oct., 1923	A. Brause, Ohio	Dec., 1921
W. B. Abell, N. Y.	Oct., 1923	B. A. Abbey, Ohio	Dec., 1921
A. J. Brookman & Co., Vict.	Sept., 1923	J. Ingvarson, Minn.	Dec., 1921
Australia	Sept., 1923	A. F. Millebrandt, Mich.	Dec., 1921
W. R. Turner, Man.	Oct., 1923	J. H. Teufel, Jr., Illinois	Dec., 1921
C. Nelson, Nebr.	Sept., 1923	R. C. Brown, Mo.	Dec., 1921
J. Hughes, Ohio	Aug., 1923	C. Beyer, N. D.	Dec., 1921
H. M. Anderfuren, Calif.	Aug., 1923	G. Nichols, Okla.	Dec., 1921
Camp Brothers, Texas	Aug., 1923	F. H. Joahn, Mass.	Dec., 1921
L. C. Larson, Iowa	July, 1923	J. B. Scheldier, Indiana	Dec., 1921
S. Effenar, South Africa	July, 1923	J. H. Ickes, Pa.	Dec., 1921
G. L. DeWitt, Mont.	July, 1923	E. Willis, Colorado	Nov., 1921
W. W. Gregg, Texas	July, 1923	A. Elliott, England	Nov., 1921
W. R. Stroupe, N. C.	July, 1923	J. Beam, N. J.	Nov., 1921
O. C. Young, Michigan	June, 1923	F. Kolarik, Iowa	Nov., 1921
Otto Sippel, Pa.	June, 1923	A. McNab, Scotland	Nov., 1921
A. Chapman, N. Y.	June, 1923	J. Delane, Nebr.	Nov., 1921
C. Birely, Md.	June, 1923	A. Marks, N. B. W. Aust.	Nov., 1921
F. H. Shupe, Pa.	June, 1923	O. R. Stevenson, Ill.	Nov., 1921
J. C. Storer, Pa.	Apr., 1923	J. Meier, Minn.	Nov., 1921
W. Schoonover, Pa.	Apr., 1923	J. O. Aitkin, Aust.	Oct., 1921
J. M. Rumire, Iowa	May, 1923	W. Knout, Ala.	Oct., 1921
Lansdale Brothers, Mo.	Mar., 1923	O. M. Johnson, Miss.	Oct., 1921
J. Carwell, Ark.	Mar., 1923	J. K. Gilnicki, Mich.	Sept., 1921
G. E. Glazier, Ohio	Mar., 1923	H. Feldus, Nebr.	Sept., 1921
G. Gath & Co., S. Africa	Mar., 1923	R. Murray, Calif.	Sept., 1921
T. Bradley, N. S. Wales	Mar., 1923	A. Hammond, Calif.	Sept., 1921
L. T. Needham, Illinois	Feb., 1923	P. Wedel, Kans.	Sept., 1921
G. C. Distinger, Miss.	Feb., 1923	J. Ackerman, Indiana	Sept., 1921
J. Wieber, Minn.	Jan., 1923	A. Harper, Mont.	Aug., 1921
Z. A. Enos, Minn.	Jan., 1923	L. E. Bonton	Aug., 1921
W. G. Wise, Calif.	Jan., 1923	C. Pearce, Australia	July, 1921
F. S. Bishop, South Africa	Jan., 1923	J. Watson, S. Africa	July, 1921
J. Curran, Arizona	Jan., 1923	R. Goldschag, S. Africa	July, 1921
S. P. Harney, Mont.	Dec., 1922	C. Hammerstrom, Minn.	July, 1921
W. Breckner, Okla.	Dec., 1922	A. S. Pratt, New York	July, 1921
J. Pabina, Nebr.	Dec., 1922	E. H. Spain, Ariz.	July, 1921
B. A. Steinke, Ohio	Nov., 1922	L. H. Strange, Viet., Aust.	July, 1921
Shepard & Son, N. Y.	Nov., 1922	W. Urquhart, New Zealand	June, 1921
P. Frederickson, Iowa	Nov., 1922	W. Voigt, S. Africa	June, 1921
L. O. Leurin, Illinois	Nov., 1922	J. M. Werl, Pa.	June, 1921
W. Lawson, New Zealand	Nov., 1922	E. Toll, New Zealand	June, 1921
S. Shields, Kans.	Oct., 1922	G. Johnson, Kans.	May, 1921
W. O. Grant, Calif.	Oct., 1922	S. Budds, New Guinea	May, 1921
W. H. Miller, Iowa	Oct., 1922	H. Baker, Australia	May, 1921
S. Lee, Wash.	Sept., 1922	F. E. Smith, Vermont	May, 1921
A. O. Martin, Idaho	Sept., 1922	A. J. Hatch, Maine	May, 1921
O. A. Mortimer, Idaho	Sept., 1922	W. Cornwell, Pa.	May, 1921
H. J. Hyatt, Washington	Sept., 1922	W. F. Kline, Kansas	May, 1921
N. S. Skow, Iowa	Sept., 1922	J. Kirkbridge, N. J.	May, 1921
A. D. Standiford, Washington	Sept., 1922	Thos. McNeill, Scotland	May, 1921
T. Temkiewicz, Quebec	Sept., 1922	T. Holloway, Kans.	Apr., 1921
Clark & Fauset, Aust.	Aug., 1922	W. Winget, Vt.	Apr., 1921
A. Pellifer, Ohio	Aug., 1922	J. A. Johnson, N. D.	Apr., 1921
W. D. Valentine, Iowa	Aug., 1922	D. H. Laird, N. Y.	Apr., 1921
H. Devonshire, N. Z.	July, 1922	A. J. Prue, N. Y.	Apr., 1921
E. T. Cull, Ky.	July, 1922	C. A. Butler, Ohio	Apr., 1921
G. Hoffman, N. Y.	July, 1922	E. Mossner, Queens, Australia	Apr., 1921
J. Erman, Ark.	July, 1922	J. Laux, Oklahoma	Apr., 1921
W. R. Gelling, Australia	June, 1922	C. L. Cease, Pa.	Mar., 1921
W. K. W. Hansen, Pa.	June, 1922	E. Landblad, Nebr.	Mar., 1921
Robert Tochter, Calif.	June, 1922	F. Bowen, N. Y.	Mar., 1921
J. Van Marter, N. Y.	June, 1922	W. F. Tippey, Mich.	Mar., 1921
J. T. Brann, Iowa	June, 1922	J. T. Bohn & Son, N. Y.	Mar., 1921
A. Olson, Minnesota	June, 1922	W. C. LeBow, Mo.	Mar., 1921
Otis Aliman, Mich.	Apr., 1922	William Pate, Mo.	Mar., 1921
E. Schnelle, Ohio	Jan., 1922	A. T. Jameson, Colorado	Mar., 1921
J. Bunker, Iowa	Jan., 1922	C. Alexander, N. Y.	Mar., 1921
F. Norrie, Yukon Ty.	Jan., 1922	J. Feuchl, Wisc.	Mar., 1921
J. Needham, Kans.	May, 1922	H. Cornils, Oregon	Mar., 1921
E. Anders & Son, S. Aust.	May, 1922	C. Schmid, Nebr.	Mar., 1921
Louisa Carriage Works, Va.	May, 1922	J. Schwarmann, D. C.	Mar., 1921
S. Wilkin & Sons, N. Y.	Apr., 1922	M. Stettner, Minn.	Mar., 1921
R. H. Kuhrt, Iowa	Apr., 1922	Elmer Wetzel, N. J.	Feb., 1921
S. Smith, Texas	Apr., 1922	J. Potthoff, Nebr.	Feb., 1921
E. Burrows, Eng.	Apr., 1922	N. E. Hart, Okla.	Feb., 1921
A. J. Neill, Vt.	Mar., 1922	C. Knudson, Iowa	Feb., 1921
W. Muckle, Ontario	Mar., 1922	S. Button, Kans.	Feb., 1921
M. Burke, Ariz.	Mar., 1922	N. F. Hartase, Mo.	Feb., 1921
J. W. Hodge, N. Y.	Mar., 1922	I. Qoeppre, N. C.	Feb., 1921
J. W. Haar, La.	Mar., 1922	R. E. Worthington, N. Y.	Feb., 1921
D. W. Smith, Rhode Island	Mar., 1922	B. E. Doggett, Kansas	Feb., 1921
E. A. Dillon, Nev.	Mar., 1922	Shellhaas & Fry, Colorado	Feb., 1921
D. F. Kuster, Washington	Mar., 1922	J. Tooes, Kansas	Feb., 1921
C. A. Whitacre, Ohio	Mar., 1922	J. W. Wilson, Mo.	Feb., 1921
J. Poettgen & Co., Missouri	Mar., 1922	W. T. Wilson, Indiana	Feb., 1921
W. T. Long, Colo.	Feb., 1922	J. Schmid, Nebr.	Feb., 1921
C. Robertson, S. Africa	Feb., 1922	E. Slee, New York	Feb., 1921
J. Zavadnik, Kans.	Feb., 1922	A. R. Skerritt, New York	Feb., 1921
P. C. Oldroyd, Utah	Feb., 1922	W. H. Starkey, Kans.	Feb., 1921
V. Vanouret, Wisc.	Feb., 1922	W. Singleton, Pa.	Feb., 1921
W. Parker, Mich.	Feb., 1922	E. N. English, Iowa	Jan., 1921
J. DeGlopper, Mich.	Feb., 1922	H. Becker, Ill.	Jan., 1921
Nordstrom Bros., Kans.	Feb., 1922	G. Tice, N. J.	Jan., 1921
G. F. Johnson, Michigan	Feb., 1922	J. Brue, Vt.	Jan., 1921
J. Schoenberger, Ohio	Jan., 1922	A. Bartlett, Vt.	Jan., 1921
A. Bargett, Pa.	Jan., 1922	E. H. Manley, Mo.	Jan., 1921
R. H. Keith, Iowa	Jan., 1922	Newfeld & Giesbrecht, Kans.	Jan., 1921
W. Parks, Ohio	Jan., 1922	C. A. Abbott, Ohio	Jan., 1921
O. Dannebaum, Minn.	Jan., 1922	Feldmeyer & Schaake, Mo.	Jan., 1921
O. Stenning, S. D.	Jan., 1922	A. Josepet, Colorado	Jan., 1921
W. Claffey, Illinois	Jan., 1922	C. L. McNail, Mo.	Jan., 1921
J. Williams, Australia	Dec., 1921	A. Turley, Kansas	Jan., 1921
C. Beggs, Alaska	Dec., 1921	A. Seidel, Nebr.	Jan., 1921
J. J. Kilma, Nebr.	Dec., 1921	W. Ruple, Pa.	Jan., 1921



Bending Steel Tubes

JAMES STEELMAN

Steel tubes occur in such variety nowadays that it is a practical necessity for one to know how to bend it. This is particularly so where much automobile work is being handled.

Some steels are made of such excellent material that cold bending may frequently be used. This is particularly the case with cold drawn weldless steel tubes. The process of manufacture through which the tubes pass originally demands a high class of materials. If the smith is in doubt as to the quality of the steel tubing, they will do well to take no chance and heat the work instead. Even where the quality is right, a considerable hardness of the metal may make cold bending a somewhat risky proposition.

Steel tubes are manufactured with various degrees of hardness depending on the character of service the tube is designed to perform. Sometimes, it is quite essential that the tube be rigid and strong. And as carbon gives these qualities, such steel will contain more carbon than where a soft, pliable material is wanted possessing moderate strength. The smith can get a line on the tubing he had in hand by using a file on it. If he is satisfied that the tube is weldless and has been made by cold drawing, he may be pretty confident of the quality.

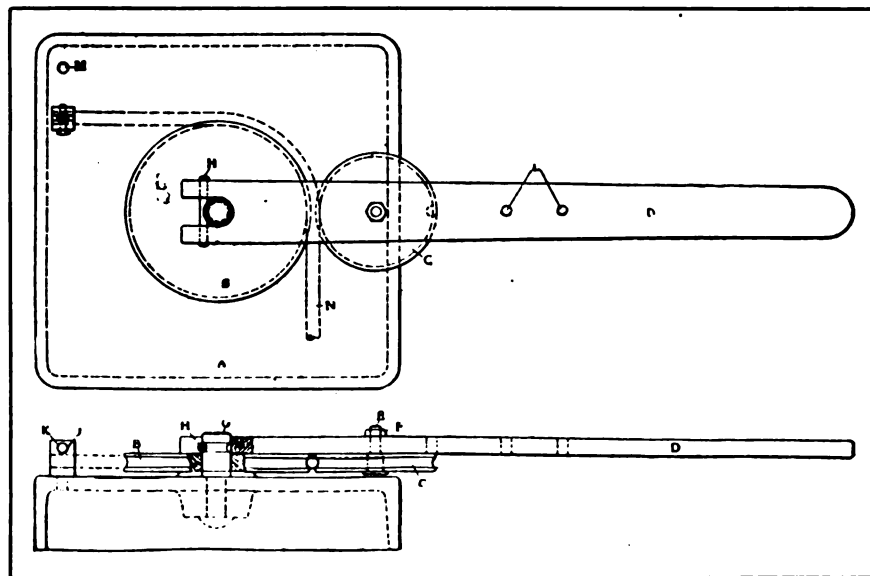
Some tubing may be bent just as it is; it is safer, however, to *fill* all work before attempting to bend it. For *cold bending*, a very useful material—though not the only one—is *lead*. This metal melts at about 619 degrees, Fahrenheit, and this low melting point makes it especially desirable to use, as we shall see. We heat the lead in some suitable vessel, put a funnel in one end of the tube,

after plugging the other end or standing it on the ground, and then pour the lead in to fill up the interior space. Its low melting point make the re-melting an easy matter and greatly facilitates the removal of the metal from the tube after the bending is completed. The whole is simply heated and the lead permitted to run out into some vessel or other. When we note that 619 degrees is 250 degrees lower than the lowest red that is visible in the dark when steel is heated, we will perhaps understand that the necessary heating of the work to get rid of the lead will not injure the steel or even enlarge its grains. Of course, one may go at the heating so carelessly as to heat a part of the tubing much beyond what is needful. Instead of simple lead, one may use some of the alloys of the metal. The object in view in using a filling is to keep the tube distended everywhere while bending is going on. The thinner the tubing, other things being equal, the more necessary it is to use a proper filling. Furthermore, with thin tubing, heavy material for filling seems to be especially desirable. Lead, it will be seen, is just about the thing.

For *hot bending*, we may substitute *sand* for lead. We plug the ends of the tube, completely filling the intervening space. Instead of sand, we may sometimes use a soft iron rod. However, in this case, we should look ahead and consider how we are go-

we need ordinarily expect but little trouble in removing the rod, provided our means for bending are right. But if one part of the tube is to be left straight, or even if one part is curved differently from another part, the rod will stick. On the other hand, the rod is permissible where the tube is to be regularly coiled with all coils the same size. The rod may be "unscrewed" out of the finished coil. The fit of the rod should not be too tight to permit withdrawal nor too loose to provide suitable support. We must not overlook the fact that, when bending is going on, we have two pieces of metal to bend. If the rod is not especially soft, naturally the heat may be needed to penetrate into it to make the work go along easily.

In doing the actual bending of steel tubing, we should forget all about hammers and anvils and vises and wrenches. The work is not to be struck. A special bending device is, in general, absolutely essential. It need not be an elaborate affair, and may be properly made for the most part by the smith himself in his own shop. There are several varieties. A representative apparatus will have a suitable form or mandrel on which the tubing is to be bent. This may or may not be a full circle. Even when we wish to make a bend of a complete circle, it will usually be unnecessary to have a form of more



—Courtesy "Horseless Age"

FIG. 1.—BENDING DEVICE FOR TUBES AND RODS

ing to get the rod out after the bending. If none of the tube is to be left straight and the whole length is to be bent to the same degree of curvature,

than a fraction of the full circuit. In addition to the mandrel or form, we need a stop for holding the work against the form. A lever is to be



provided, by means of which the tube is forced up against the form and the bend produced. All this, so far as I have described is pretty much the same as for some of the devices used for bending solid bars. There are certain differences, however. The edge of the form should be provided with a groove to support the tubing better than is possible with a plain surface. Naturally, the groove is round in section. But, the radius of curvature of the groove section is a trifle larger than the radius of a section of the tubing. It is not necessary to make it very deep—something distinctly less than a semi-circle is all that is necessary for the groove section. The surface of the stop against which the end of the tube presses should also be grooved. The fulcrum, or point of support, around which the lever turns is not left to be simply where one can get support, but is fixed at the center of the circle of the bend that is to be made. Then, instead of using a simple projection on the lever as the thing to come against the tube and force it up against the form, a grooved wheel is employed. There is no dragging action at all when this wheel operates against the tube, but a simple rolling action. The groove is made similar to that in the form. It may be wise to give this groove a good depth, so as to provide for good control of the tubing. The diameter of this wheel may, within reasonable limits, be anything you like. It does not have to agree with the diameter of the circle of the form.

I give drawings of two varieties of machines unable for tube bending. One of these (See Fig. 3) comes from an English source; the other, (Fig. 1.) from *Horseless Age*. With respect to this latter device, it is said that the tubing need not necessarily be filled with sand or other material. There is a cast-iron base A. This is cored out underneath, thus giving comparative lightness and saving iron. It may be 2 feet on a side. A boss is arranged underneath at the center to add to the thickness and thus give good support to the stud pin G. There is also a slight boss on top in the same region. This enables the wheel which is to be mounted on the stud to clear the top of the table. The stud pin may be made in two parts. One will be the equivalent of a bolt with its head underneath. The second part will thread on the upper end of the bolt and form a kind of nut. The lower part of this nut provides a bearing surface upon which

the grooved wheel B may be mounted. The upper part is provided with a groove. The lever D is slotted at one end to permit it to get a bear-

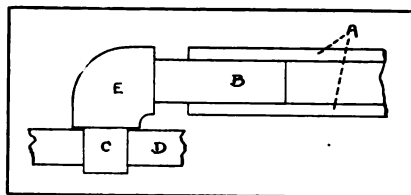


FIG. 2—SECTIONAL VIEW OF STUD MADE IN ONE PIECE:

A—TUBE END;
B—HORIZONTAL END OF STUD;
C—VERTICAL END OF STUD;
D—TABLE;
E—ELBOW.

ing against the top of the stud. A tapered pin holds the lever in place, this pin lying in the groove in the top of the stud and permitting the lever to be turned in a horizontal plane. The lever may be made of hard wood, in which case we use a bushing between the wood and the top of the stud. This bushing may be cut away at one spot so as not to interfere with the tapered pin H. Underneath the lever is mounted a second grooved wheel C. A suitable pin and nut provide a bearing. Note that the head of this pin at the bottom is made quite flat to permit it to move back and forth over the table. It should be observed that this second wheel C may be set at various points along the lever, thus providing for the use of various sizes of the wheel B. The changes in B correspond to changes in curvature that may be desired. It is not necessary to have more than the one size of C, although it may be serviceable to have various wheels to provide changes in groove for different diameters of tubing. The provision with this machine for holding the tube is rather an elaborate one. A short piece of square bar is turned round for, say 1 inch at one end. A suitable hole of the same size in the table permits the insertion of this rounded end. This place is to provide for a clamp through which the end of the tube is to extend. Consequently, we bore a hole through the other end of the piece, the hole running clear through from one side to the side opposite. This hole is made a trifle larger than the pipe which is to be held. To produce the grip on the pipe, the hole will have to be contracted. Accordingly, we saw through the material above the hole, making a slot running parallel with the axis of the tube

when in position. By drawing together the metal to each side of the slot, we will narrow the hole and grip the tube. We may provide for this clamping action in one of two simple ways. We may bore a smooth hole through the metal on both sides of the slot, this hole being perpendicular to the plane of the slot, and use a bolt and nut. Or, we may leave the hole smooth to one side of the slot and thread the other part. A square-headed bolt, threaded to match this thread and made of the proper length will give us the means of clamping. However, it seems simpler to the writer to use a different form of stud (See Fig. 2). Instead of clamping the tube from the outside, we may use a kind of plug inserted in the tube. We take a piece of round stock of suitable size and length, and prepare the one end for insertion into the table top. That is, we use stock larger than the hole in the table, turning the end of the piece down to the proper size. In this way, we provide a suitable shoulder. We bend the other end at right angles and this provides for the piece to enter the tube. If necessary to reduce the size, we turn this end to the interior diameter of the tube before putting in the right angle bend. Such a stud is easy to make and will support the walls of the tube during the operation of the machine. The fit with the tube should be moderately tight, and this part of the stud should not be too short. By using this form of stud, we get rid of the boring of holes in the stud. We need have but one operation on the lathe, if we select stock of just the right size for entrance into the tubing. It is not necessary to confine ourselves to a single hole in the table top. There is an advantage to be gained by the use of the more elaborate stud that one should consider before making a final decision. In using the machine with the clamp arrangement, we may run the pipe in *towards* the forming wheel. Here it may be bent, little by little, the feeding in of more and more pipe being accomplished by continuing to shove the pipe through the clamp in the same direction used when starting. Of course, we loosen and tighten the clamp for every advance. Besides, the simpler stud does not provide against the tube pulling off; so that at the beginning of an operation, we might have to hold the tube on to keep it from slipping.

The machine seems to leave a

short piece of tubing un-bent. In order to complete the bending, whether we use one style of stud or another, we may proceed as follows: A little before the machine has approached its limit, we insert in the tube a snug-fitting rod as far as it

These rings correspond to the forming wheel of the other machine. The tube or bar that is to be bent is forced against the edge of the ring. Naturally, the precise shape of this edge will vary in accordance with the nature of the work. For tubing,

central stud. Now we may perhaps make one or two changes in this apparatus which will probably make it easier to construct. If it seems easier to use a wheel for the curved form instead of a ring, then we may dispense with a good many bolt holes. If we use a sector of a circle instead of a complete wheel, we may need a hole of some kind in order to provide for keeping the sector in place. As to the material to use for the table—wood or cast-iron—the smith may judge for himself, taking into account the work he proposes to do.

(To be Continued)

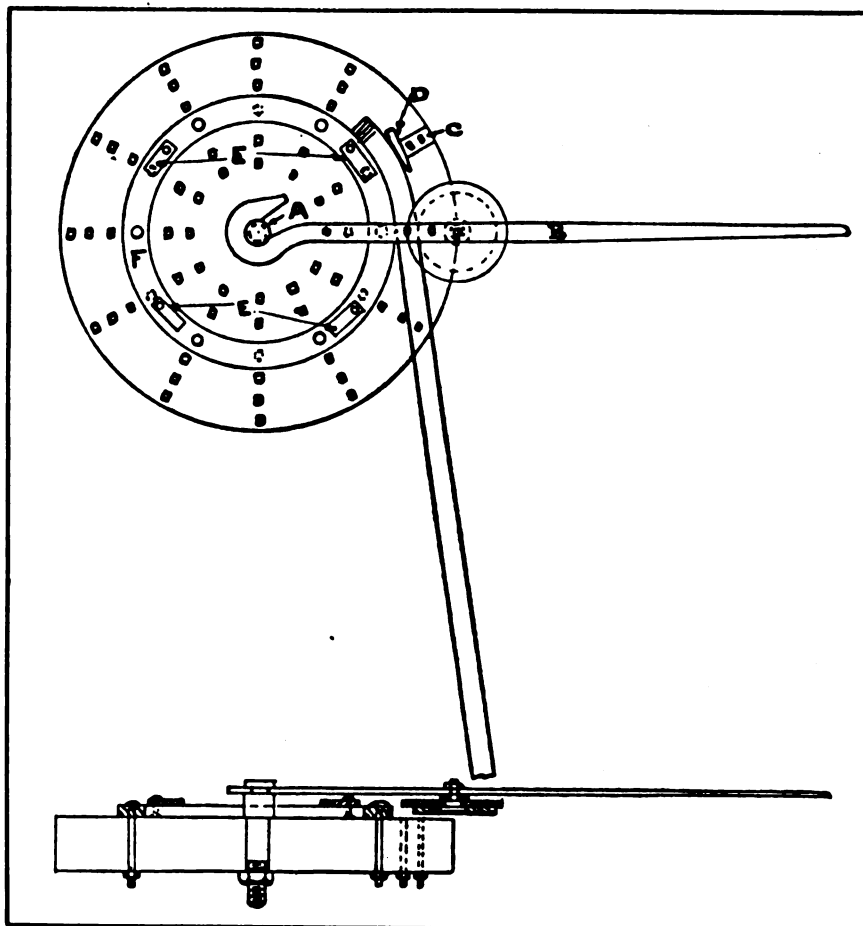


FIG. 3—A BENDING MACHINE OF ENGLISH DESIGN

will go and do the final bending that we would ordinarily do with the machine with the rods thus in place. We now go to a finish by simply advancing the rod in the clamp and using the latter to hold it. Of course, we may need to pack the rod in the clamp in order to make it grip.

This machine and also the one yet to be described may be used to bend flat bars on the edge and the standard forms of angle bar. I will now give an account of the second machine.

The apparatus which is perhaps of English origin consists in part of a circular table pierced with numerous holes. (See Fig. 3). These holes are arranged along radius and correspond to various circumferences. They provide a means of securing a ring of metal to the table with ordinary bolts. We may take off one ring and put on another of different size, using another group of bolt holes.

it will be best to provide the forming edge of the ring with a curved groove. It will often be unnecessary to provide more than a moderate sized arc—say 60 degrees in length. The bolt holes also provide a means of securing a suitable stop to hold the work up to the forming ring. Naturally, the shape of this stop will vary with the work. A large hole is provided at the exact center of the table. We thus provide for a stud pin projecting up from the table at its center. This gives us a suitable support against which to press in turning a lever. The lever, just as in the other machine, is fitted with a wheel on a removable stud. This wheel, as before, is the element which presses up against the work and curves it round the form. Its edge will naturally be shaped to suit the work. The inner end of the lever is made in hook form, permitting it to be readily put in place over the

Put the Power Hammer to Work—5

WILL BISHOP

Everything must have a handle—something to take hold of or be known by, such as the lever of a pump or the baptismal name of a man. The blacksmith is called upon to make many kinds and classes of handles in his day's work; and very often, without being called upon, he voluntarily hangs an extra one on some tight-wad customer. Anyway, whether we use our hands or our tongues in fashioning a handle, it is our desire and aim to do it well. And with this end in view, I aim in this article to show the method of Old Man Power Hammer in making handles of varied and divers kinds.

Auto-busses, bakery wagons, butcher's wagons, and vehicles—both hay and gasoline burners of many kinds, require handles on the doors which combine both rigidity and neatness of design. In the sketch at Fig. 1, is shown a model of door handle that can be made in any size, and to suit any door. It is quickly made, and, when finished, need not have a hammer mark on it, and will require no grinding or filing to give it the proper finish. Besides being a quick effective way of making door handles, with just a little change, hand-rails of various kinds are made by the same method that are just the dope the doctor ordered. Now suppose we want to make a handle—say with a hand-grip about six inches long—and have to do 'er in a hurry. This is the way we'll do it: just grab your balling-swage, the one with a 1" ball diameter, and a 5/8" shank diameter, and lay 'er over by the hammer. Then cut off a piece of 1" round iron about 4" long, heat up one end good and hot, trot over to the hammer and swage a ball on 'er like sketch at Sec. 1, at A. Heat up



other end and repeat the dose, then draw out center and swage round with a $\frac{5}{8}$ " round swage. There, your hand-grip is made, and not a mark on it. Next comes the foot-pieces. You don't need much in the way of tools for making those, just a $\frac{5}{8}$ " heading-tool and an old axle nut or two. Now get a piece of $1\frac{1}{4}$ " square stock—a piece of old spring wagon axle will do like a top. Heat up and fuller in all 'round about two inches from end, draw out under hammer and round up with a $\frac{5}{8}$ " swage, as in sketch at Sec. 3, at A. Then grab a hot-cutter and cut off as at B, leaving about 1" of square stock on the $\frac{5}{8}$ " shank, and trim the $\frac{5}{8}$ " shank to 3 inches long. Heat 'er up, now, and when she's hot, step over to the hammer and poke the shank through the heading-tool, place one—or two, if required to lift shank above bottom hammer die—axle nut on bottom die of hammer; place the heading-tool on top of nut, and smash 'er down to about $\frac{5}{16}$ of an inch thick. Take out of heading-tool, now, and trim your plate to, say, two inches square, and drill holes as in sketch at Sec. 2, at A. Cut threads as at B, and this section is complete. All right, now drill holes $\frac{1}{2}$ " in diameter in each of the balls on the hand-grip. Better drill 'em about $\frac{3}{4}$ of an inch deep, and on a perfect line. Tap threads in with a plug-tap, and screw in the feet, as in Fig. 1 at C. Pretty nice looking handle, eh! Try it out.

Here's another handle that we are all acquainted with. Cast your mechanical eye over the sketch at

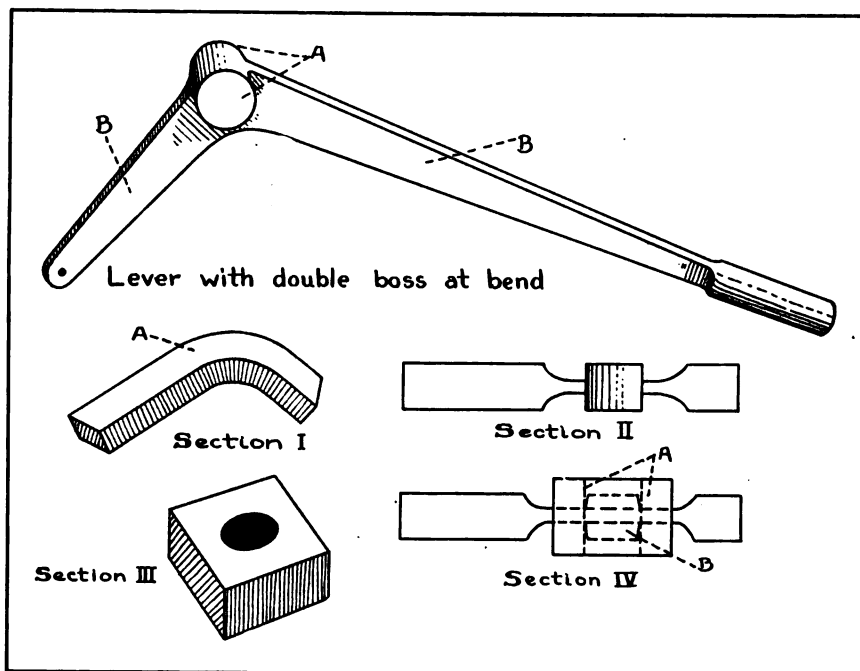


FIG. 2—FORGING OUT A LEVER ON THE POWER HAMMER

Fig. 2. How often we have all knocked the stuffin' out of that one of the Ten Commandments which forbids cussin'—when some slab-sided son of the soil dragged an old rusty harrow, cultivator, or some other tool with which he tickles the bosom of Mother Earth, up to our shop with every pot-metal lever and handle on it broke in four places. We just nacherly busted that commandment so that it wouldn't hold hay; but that didn't get us anywhere, nor mend those pesky levers. But, now, that we've learned to let Old Man

Hammer do it, we've cut out the cussin' when we see a broken cast lever. We just throw the old lever away and make a new one. Of course, there are many kinds of farm implement levers, with many different kinks in them; but the one in sketch at Fig. 2 will do for an illustration.

You will note that on this lever there is a double boss at the bend, one on each side of the lever. See sketch at A. Now suppose the flat of the lever, at B-B, is to be made $\frac{3}{8} \times 1\frac{1}{4}$ inches, and the boss on each side is to be 1" in diameter, and $\frac{1}{2}$ " high. In that case, get a piece of $1\frac{1}{2}$ " square stock and bend as at Sec. 1, at A, leaving enough stock on short end to make short end of lever whatever length desired. The next step is to make her look like sketch at Sec. 2. To do this, get two 1" heading-tools with round holes in them, heat your job at the bend, good and hot, place one heading-tool on the hammer-die, lay the heat across the hole at place boss is wanted and lay the other heading-tool directly over in a manner that will bring one hole squarely over the other, and smash down until the two heading-tools are about $\frac{3}{8}$ of an inch apart. See sketch at Sec. 3 for heading-tool; and Sec. 4 for illustration of the way the job is done. The dotted lines at A, in Sec. 4, represent the holes in heading-tools, bosses mashed into holes, at B. Now then, the ends are to be drawn out. Heat up the long end of the job and draw out the flat, as at A, in Fig. 3. Leave

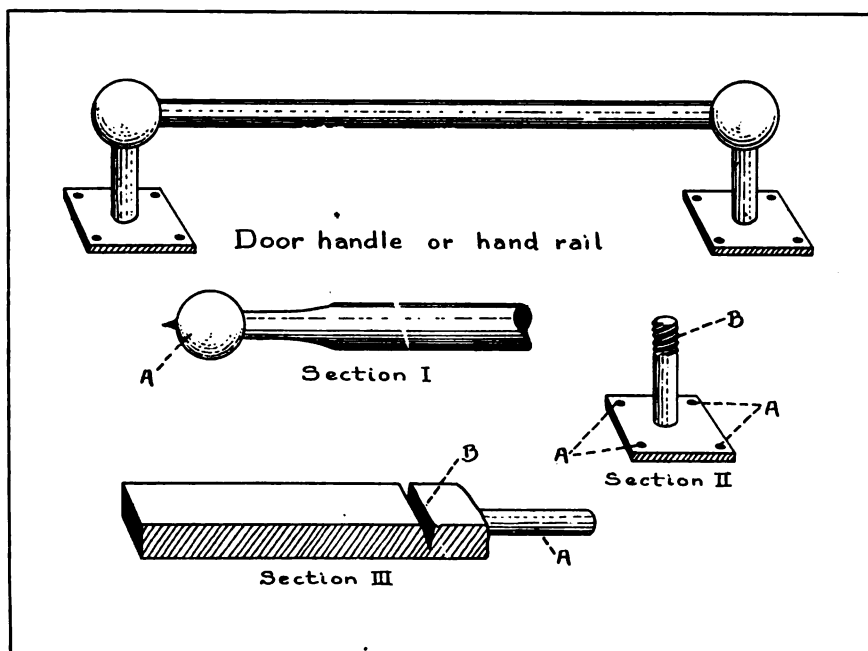


FIG. 1—HOW THE HANDLE, DESCRIBED BY MR. BISHOP, IS FORGED



enough of original stock at the end to make the hand-grip, at B, which should be 1" round. Draw the hand-grip down under the hammer, and

is born, not made; but I never thought much of the expression until I stumbled onto "Doc Mud." Born in Bellaire County, Missouri,

revealed a "hoss" in process of formation. The finished animal, together with a few of his other achievements appear in the accompanying pictures.

"Doc Mud" spends much of his leisure time sculpturing these little animals. His material is the common Texas black mud, quantities of which are to be found in all the roads of the section. From it he easily and perfectly forms horses, trees, cows, dogs, monkeys—in fact, almost any form of Nature. After the images are dried, he paints them in natural colors. Just how true to life they appear can be determined from a glance at the illustrations. Many, who have seen samples of his work, consider it far above the average for similar work turned out by students of art.

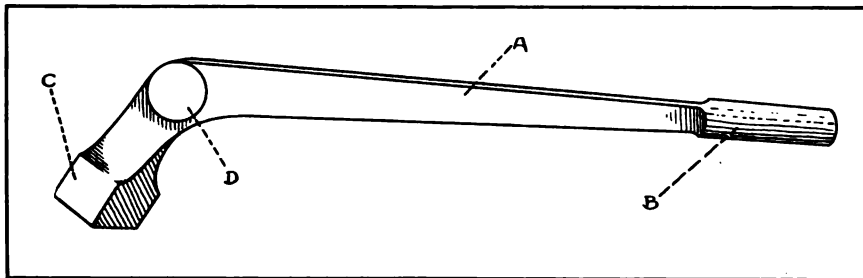


FIG. 3—STEPS IN DRAWING OUT THE LEVER

swage round in a 1" swage. When you've drawn out short end, at C, to the length required, the lever is about done. Note the web on inside of lever at D. In smashing the bosses on in the heading-tools, there will be left on each side a web the same thickness as the flat of the lever. Trim off all the web on the outside, but leave about $\frac{1}{4}$ of an inch of it on the inside to increase the strength of the lever. Bore your holes, and there she is—done. And it won't be necessary to touch it with emery or file to give it finish. Mr. Power Hammer is a powerful smooth worker. Of course, you readily understand that if the boss is wanted only on one side, only one heading-tool is used. By this method you can slap a boss on one or both sides, and in any place you want it. Also any size you want it, up to the heaviest stock you hammer will handle. It is much quicker, neater, and stronger than welding the boss on a flat bar. The lever I have described above can be made in almost the time it has taken you to read this article—if you don't read too fast!

Now, Brother Anvil Wallopers, this article winds up the series on the Power Hammer. At least, for the present. But, as I told you before, I'm a loquacious cuss—don't in the least mind listening to my own gab, even if other folks do—you will no doubt see in several issues of Our Journal to come, little articles by The Bishop on shop tools, shop kinks, shop business, and in fact, any old thing that I think will be of interest to The Boys. Always provided, of course, that I can wheedle our long-suffering editor into printing them.

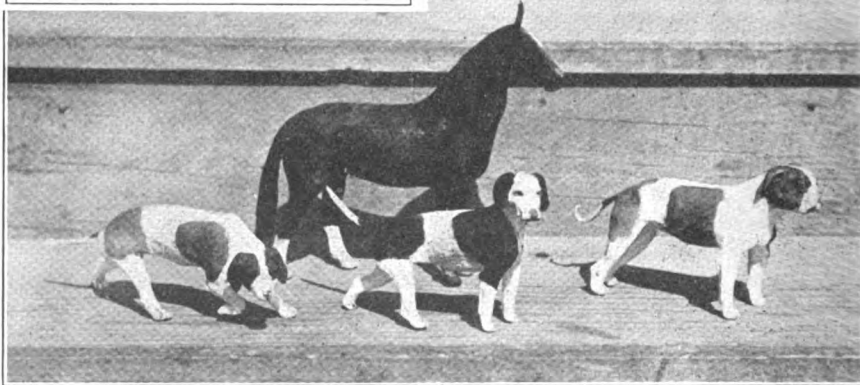
"Doc Mud" Negro Sculptor and Doctor of Horses

JOSEF H. NOYES

Someone has said that an artist

he was raised on a farm where he had a chance to study Nature and acquire a natural love for animals. At an early age he showed marked artistic talent, and while the other little pickaninnies were making mud pies, he would try to shape dogs, horses, pigs, and sometimes possums. As he grew older, his love for Nature led him to take up horse doctoring, which is the profession he now follows.

When I "discovered" him, it was on one of those hot, dry days when even the cotton wilts, and the chickens seek a cool spot under the tumble-down nigger cabins. I approached his neat cabin and noticed sitting on the porch a big black, smiling and happy-go-lucky negro, who



SOME REMARKABLE PIECES OF SCULPTURE IN MUD CREATED BY "DOC MUD," A WELL-KNOWN TEXAS "VET"

was none other than "Doc Mud" himself. He was fashioning something in his hands that looked like a mud pie, but closer examination

flame straight toward the melting metal. As soon as the metal is all fluid and will blow about easily, drop the torch a little to one side

The Oxy-Acetylene Plant—8

Its Installation, Operation, and Torch Manipulation

DAVID BAXTER

Hot Finishing

After the weld is completed and sometimes as the torch is being used, the weld may be given a sort of finishing or smoothing by manipulating the flame to that end; but experience and practice are necessary to do this finishing without injuring the metals. It is really the blowing of the metal into the desired shape.

Sometimes it is necessary to re-heat the weld for a space of two or three inches by passing the flame back and forth over it, holding the



and sweep the metal along before the flame. Hold the flame as close as is necessary to blow the metal along. If the entire weld has not been finished, blow the metal toward the part yet to be welded or toward any hollow spot in the weld. High spots may be blown to the low spots leaving a smoother and better looking weld.

This operation requires some practice and is sometimes rather discouraging, but it proves to be very handy after it is once mastered, especially where a customer cannot wait for the job to cool enough to enable one to file or grind it. Hot finishing is recommended for such metals as aluminum, cast-iron and bronzes or metals that disintegrate when hammered. Steels, wrought-irons and copper and metals that do not crack or fall to pieces easily can be hot-finished with a hammer. This hammering can be done as the welding proceeds.

As fast as a few inches of the weld is done it is tapped down smooth with a light hammer. Do not commence hammering too soon, wait until the melted metal is set or changes from a white to a red heat. The higher spots should be hammered out toward the lower spots; and in a general direction toward the welding. A neat arrangement is for one person to do the welding and the other following with a hammer.

This hammering is beneficial in other ways than merely adding to the appearance. It packs the grains closer and produces a tougher and more solid weld. It also tends to settle the melted metal in the weld ahead.

Another method of hot-finishing, sometimes tried with varying success, is to scrape the melted metal away just before it sets or hardens. This requires a keen judgment as to the proper time to proceed. The metal should be between a white hot and a red. Use a file or other flat piece of steel, being sure to keep it pressed flat on the surface of the casting; swipe it quickly and evenly across the surface of the melted weld. One swipe should do the business as it can seldom be repeated. One thing that recommends this method is that it saves time on a heavy or a hurry-up job.

If you can not make a success of these methods of hot-finishing right from the start, do not be discouraged but be assured that with practice you will meet with a fair measure of success. (To be Continued)



Benton's Recipe Book

To Remove Scale from Cast Iron—A solution made up of one part vitriol and two parts water may be effectively used to remove the scale from cast iron. Mix well and apply with a cloth rolled in the form of a brush, wetting the surface well. In eight or ten hours wash off with water and the scale will come too.

To Tell High-speed Steel From Common Steel—It is next to impossible to tell high-speed steel from common tool steel, by its appearance. Touch the piece to an emery wheel and the spark tells the story. Common tool steel gives a yellow spark, while the spark from high-speed steel is blood red, much like the spark that is obtained when grinding cast iron.



Queries—Answers—Notes

Another Young Smith Who Likes "Our Journal"—Please find enclosed \$1 for renewal for one year.

It is the best paper that I have ever read. I am a young blacksmith — only been in the business about three years, and I find a great many useful articles in your paper.

ED. AULT, N. Dakota.

Wants to rebuild Ford into Racing Car—I am going to rebuild a Ford Auto, and will be very much obliged to you if you can give me the address of some Company that can furnish automobile racing body patterns. I want to build the body myself and just buy the pattern. Any information you can give me concerning the rebuilding of a Ford into a racing type will be thankfully accepted.

Elmer A. Olson, N. Dakota.

In answer to your request concerning patterns for transforming a Ford chassis into a racing body, we would suggest that you write to the Kuempel Co., at Dubuque, Iowa. They are putting out a special set of patterns which they list as "Red-i-Kut"

patterns for Ford racing bodies, Model 55. The price is \$4. for the set, including complete instructions for carrying out the work.

You might also write to a few of the following firms and ask for their catalogues on racing bodies for Fords. The illustrations therein might offer you excellent suggestions along this line, and the accessories listed may be of help to you:

The Paco Mfg. Co., Galesburg, Ill.
Auto Remodeling Co., 1505 Michigan Ave., Chicago, Ill.
Fried & Stonier Co., Peoria, Ill.
Parry Mfg. Co., Indianapolis, Ind.
Universal Car Equipment Co., 1312 Bellevue Ave., Detroit, Mich.
S. S., New York.

Sort of cull's his information out of the paper, eh? — I am a blacksmith and run a general repair shop and would not do without your journal for twice the price. When I want to find out anything I go and look over the back numbers and most always find what I want. I find the papers very well worth what it costs to any of our brother iron punishers if they would read it and pay any mind to what it teaches.

E. T. Cull, Kentucky.

Editor's note: Mr. Cull has the right idea. If readers would make it a point to keep all back numbers and refer to them whenever a puzzling problem arises, they would be greatly benefited and surprised how easy they can often find just what they need to help them.

How an Alabama shop figures costs—The figures submitted below show the actual cost of shoeing a horse figuring on a basis of 12 horses a day shod in a two man shop in Birmingham, Ala., Local No. 214.

Here we use medium weight almost exclusively and we only get \$1.25 for plain shoeing and \$1.50 for toed shoes.

Material Cost

	Medium	Reg.	Length	Shoe	
					Calks & Nails
					Overhead Ex.
					Total
No. 14	lb	@ 7c	lb .28	c	7c .81c \$1.16
No. 2 1/2	lb	@ 7c	lb .31 1/2	c	8c .81c 1.20 1/2
No. 3 1/2	lb	@ 7c	lb .38 1/2	c	9c .81c 1.28 1/2
No. 4 1/2	lb	@ 7c	lb .45 1/2	c	10c .81c 1.36 1/2
No. 5 1/2	lb	@ 7c	lb .56	c	11c .81c 1.47
No. 6 1/2	lb	@ 7c	lb .63	c	12c .81c 1.56
No. 7 1/2	lb	@ 7c	lb .73 1/2	c	13c .81c 1.67 1/2
No. 8 1/2	lb	@ 7c	lb .84	c	14c .81c 1.79

Overhead Expense

Labor at \$3.50 per day per man	\$.58-1/3
Rent	.08
Coal	.02-2/3
Loss on Accounts	.03
Depreciation on tools	.02
Office Supplies	.01
Electric service	.02
Telephone	.02
Interest on investment	.02

A. F. Lindeman, Alabama.

Trouble Dressing Mining Tools—I am a long way from home and in trouble. Am dressing tools at the mines. I followed this for twelve years and never had the trouble I have here. I have common drill steel, and we have the best of water, or I think so. We have anywhere between 10 and 20 feet of snow and at this time of the year live springs everywhere that ought to be good water. Now I dress the drills and let them cool and then heat them to a dull or dark red. I can only distinguish red in them in an ordinary well-lighted shop. Now the trouble is, I



have so many and can't take time to draw temper—have to plunge and at that use a very low heat and the corners or end of the bit breaks off with about one-third of the drills. Now if you can help me out will be more than thankful.

O. TEMPLE, Idaho.

In Reply—You have really answered your own question in the sentence of your letter where you say "the trouble is, I have so many and cannot take time to draw the temper."

You see when you quenched your drills at the very dull red, they become as brittle as that grade of steel is capable of becoming—if the quenching is done in cold water.

Try quenching them in fish oil. If this does not stop them breaking off it will be necessary to go back to drawing the temper until the color shown is a light purple bordering on blue.

If one-third are now breaking, it will certainly pay you to take more time with each drill and draw to the proper temper.

The drills returned to you for sharpening will not require near as much time to re-dress.

S. S., New York.

To Overcome Excess Oil in Cylinders—Here is a good stunt for the automobile repairman: many times one gets too much oil in the crank case; result, lots of smoke from exhaust when engine is running, on account of the oil working up from the crank case into the compression chamber.

A good remedy is to turn a small groove around each cylinder—similar to the piston-ring grooves. Now drill a small hole all the way through the walls of each cylinder in these grooves and when the engine is running, the surplus oil which causes the smoke will be scraped up by these grooves and drained through the holes back into the crank case.

J. N. BOWEN, Washington.

A Booster for Oxy-acetylene Welding—I'm going to send you a V one of these days when collections pick up, to pay my subscription up for a few years in advance. Your paper is worth many more dollars than you charge for it.

Business here is A-1, in spite of war and high prices, and say, I believe every smith ought to take hold of this acetylene welding business before the garage men get it all—these machines are to a smith what the hog is to the farmer—Mortgage lifters!

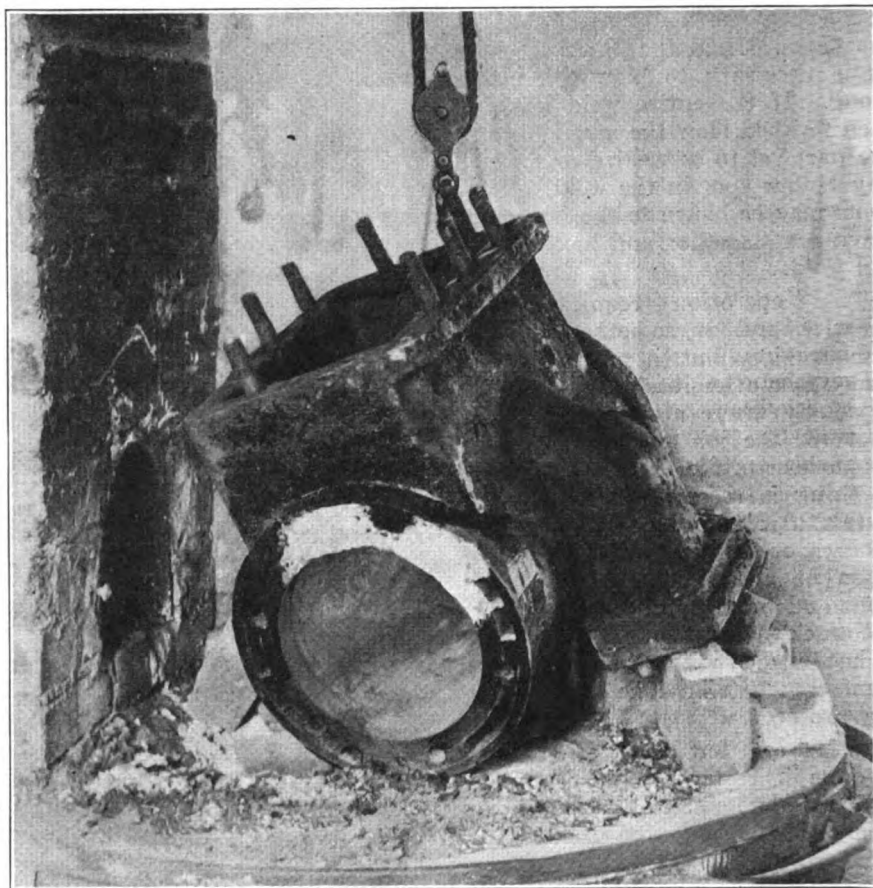
J. E. BECK, South Dakota.

Editor's Note—Let's have your opinion of the welding business in the smith shop. Tell us how you are making out with it, if you own an outfit, and send along pictures and descriptions of difficult jobs you have handled.

Likes the Articles on Shoeing—Please send me the book on Horse Shoeing by Prof. Rich.

The chart arrived in due time and am very much pleased with it. I believe your paper to be the best on the market. It treats on lines that furnish food for a great deal of thought. The two articles written by Mr. A. L. Camp are worth the price of the paper for five years, and if more horseshoers followed his ideas more closely the causes of lameness, interfering, crossfiring and knee-hitting would be removed in many cases. I learned my trade of one of Prof. Rich's students so the book will no doubt interest me very much.

O. E. Cushman, New York.



IN RANEY'S MODERN SHOP IN MISSOURI ALL KINDS OF OXY-ACETYLENE WELDING, AUTO REPAIRING, MACHINE WORK AND WOODWORKING IS DONE. HERE IS A BIG JOB RECENTLY HANDLED BY MR. RANEY AND HIS SON—PRE-HEATED IN A FORGE ONLY 3 FEET IN DIAMETER

Indiana Prices and Mr. Thomas' Shop—I have read so much about my fellow iron Brusers and Anvil Ringers, I have decided I know all of you, I enjoy reading about what kind of shops you have and how you handle them.

My shop is 55 ft. x 27 ft., has a cement floor, well inside, a 4½ H. P. gas engine which pulls a circular saw, a planer, a band saw, 2 emery stands, 1 press drill, 1 power hammer and 1 power blower connected with both fires. I have 1 cold tire setter; 1 rubber tire machine, 1 cold cut and punch. I do any kind of wood or iron work that can be done in a custom shop. I do a credit business but not to any one whom I do not know to be good pay. When I bought this shop, one year this November, shoeing was \$1.25. I was able to get a small raise within sixty days to \$1.50 and \$1.75. I charge 2c profit per lb. on any round or strap iron after all expenses are paid, and then charge 70c an hour for my labor. Have raised all buggy, wagon and plow work in the last 90 days about 20% and believe I am going to be able to get shoeing raised to \$2.00 for four new shoes and \$1.20 for four old shoes, I must say for my competitor he is an ideal fellow. We neither one will cut prices, we visit one another, loan each other anything we have. I think it is so foolish for blacksmiths to be jealous of one another, for if there are any poor cusses that need to stay together it surely is blacksmiths. They are not only kicked by their customers, but by their horses too. If their is anybody who earns his money it is an

anyil ringer. And I wish we could have a national union and all stick together like glue to rubber. I can say I have got many extra good ideas from reading the journal and can say it makes no difference how tired I am, I enjoy setting down and reading The American Blacksmith for an hour or two.

J. S. Thomas, Indiana.

Finds "Our Journal" a Good Investment—When I first saw the American Blacksmith, about fifteen years ago, I did not think much of it, but I read it some and began to get interested. I was in a little country shop then shoeing horses for 75 cents—all four shoes, and everything else at about the same price, so I put all my hopes in the paper to make me a better mechanic. Now I am holding down a fourteen hundred and sixty dollar a year job working nine hours a day, five days and five hours on Saturday. I got a raise of fifty cents a day on July first, so you see it would not be so bad if I had invested \$25 years ago for the American Blacksmith, as I never read anything but it.

I am foreman in a shop that does all kinds of horse shoeing, wagon and iron work, automobile work in all branches, etc. The shop is 110 feet long by 22 wide, arranged with paint and wood-working departments and shoeing floor.

Wishing you and yours all good luck.

Frank M. Browning, Kentucky.

A Letter from North Arkansas—Inasmuch as I have not yet seen a letter from this part of the moral vineyard, I will scratch a few words. The work has been



good here this year. Of course, prices are swelled a little, but not in proportion with the cost of living.

I have a nice country location 25 miles from Harday, my nearest R. R. point. I am surrounded by a good farming country, which lies along Strawberry River. Our town is two miles south of a river, and is a healthy place. We have the best crops I ever saw in this country and you know that means more work.

I would say to brother craftsmen, don't cut the price for when you do you cut your own throat and take from your family what is justly due them and you. Hoop up the craft and never pull it down. You don't have to cut prices to get a job; don't think that because your customer grumbles and cusses you (because you scout up a little from the old price) you will loose out, and so let him pay his own price. If he threatens to go to the other shop, tell him to "go if he chooses" and if he goes you will get some good man in his stead. I favor an organization of the craft which we have not got here.

I may have to go to the war, as I am drafted. If I do go and get back, I want to find the craft still progressing. If I have to go I want to sell out, but if not, I expect to continue to hammer iron and steel for a living. I would like to hear from some other brother in this part of the country and may God bless the workers of the craft.

I remain, a friend to all brother craftsmen.

K. C. Wingate, Arkansas.

A Handy Table of Standard Specifications for Estimating Stock Needed in Making Chains and Hooks — Having a large number of hoisting chains for handling stone and skips of various sizes to make and repair, I found it a great convenience to have a table of standard specifications to refer to. Any one having work of this nature could post a copy of these specifications in the forge shop and refer to them as the occasion demands. It will save much time and worry. The table of sizes given have proven satisfactory here where the work is of the hardest kind.

Where the hooks are subjected to unusual shocks or strains it might be advisable to make hooks of larger stock. Where the approximate load to be handled is known by referring to table the size of chain can be selected.

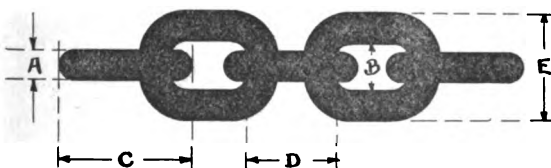


TABLE OF SIZES OF STOCK FOR MAKING HOOKS

Capacity of hook	¼	½	1	1½	2	3	4	5	6	8	10	-tons
Diameter of stock	⅞	¾	1⅞	1¼	1½	1¾	2	2¼	2½	2¾	3¼	-inches

FIG. 1.—A HANDY TABLE FOR ESTIMATING AT A GLANCE THE STOCK REQUIRED FOR MAKING UP CHAINS AND HOOKS.

STANDARD SPECIFICATIONS: Inside width (B) equals 1½ times width of stock A; Outside length (C) equals 5 times A; Inside length (D) equals 3 times A; Width outside (E) equals ¾ times A. Rings are 1½ times the diameter of chain.

Dimensions of hooks are given.

Diameter of stock for hooks are given.

For instance, a hook of four-ton capacity would require stock 2 inches in diameter and sixteen inches long. For one-eighth of an inch diameter of stock, it requires one inch in length of stock. The dimensions for hooks is taken at A, Fig. 2.

J. C. LAMON, Tennessee.

The Smithing Business in New Zealand —Thinking it might interest the readers of Our Journal as to how blacksmiths in New Zealand are faring in these Warlike times, am sending a few notes of my own case.

Our shop, a one-time, two-fire, five-hand shop including a wheel-wright, was, when the war broke out, run by my eldest son R. W. and myself with my third son as apprentice in his third year. R. W. volunteered as a shoeing smith with the mounted division of the main body that left New Zealand. It took him about 10 months to reach the firing line, and as many days to get shot through the head in a big attack on the Angae Position on Gallipoli. Meantime the second son F. A. had volunteered and is still fighting in Egypt riding his late brother's horse. The third boy I. F. who was in his third year as apprentice, kept the shop going along with myself for over 18 months, when he volunteered, put in about five months in the trenches in France, and is now in hospital in England with right arm broken and right leg wounded with shell splinters. When the eldest son left, the third son and I decided to run the shop as long as possible without assistance. In about six months iron began to take sudden leaps, so having a large scrap heap for which we had no sale in New Zealand we began to pull on it for horse shoes, especially in the winter months. When the third son left over 12 months ago, I took on a floorman and bought farmers' scrapped machines to supplement the scrap heap. We made shoes out of anything round, square or oval from spring steel to soft iron, doubled end ways or sideways, or split; worked up a pair of 4½ x ¾ types by marking off sets of 12 inch and under, heating and dividing, splitting the hot ends in four strips, dividing again and splitting both ends until we had them off in sets split at both ends. With one heat in the middle we connected the split and chopped off past the tail of anvil, 2 or three

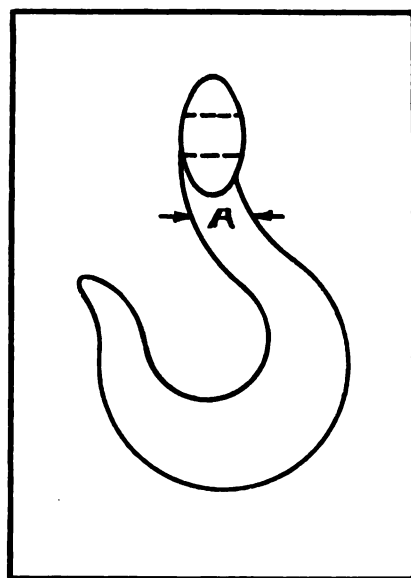


FIG. 2.—DIMENSIONS FOR HOOKS ARE TAKEN AT A.

welding heats according to length and we had our shoe.

Our union has lifted prices three times but the iron mongers kept ahead of us. The man I had for the last 12 months, and got settled to this class of work, has been called up in the ballot. I put 12 advertising insertions through one month, distributed in three papers without any reply, finally getting a 16 year old boy belonging to this district, and am still specializing in shoeing from the scrap heap to the horse, putting in my 36th year at the trade, and working in specs.

We are not a manufacturing country and the farmer is our white haired boy. Every rise compelled by the iron monger reduces the volume of our work, giving time to work the scrap heap for the better prices.

This brother smith E. W. of New Jersey has the sort of inquiry I like to see in Our Journal. He seems to want something simple and effective to use in the rush of his work and I fancy my practice of many years may help him. When I find a weakening heel, I fit an ordinary shoe on the ordinary way, then weld a piece of 1 in. or 1¼ across the heels on the foot bearing side of the shoe, leaving the round tread as usual, adding very little extra weight, making the frog on its widest part, and helping the weak heel back to normal. If lapped with good breadth of heels and well welded, it will be found strong enough to last shoe out, and is often not required next shoeing. I have never used the bar for contracted feet as I can't find hind frog to bear on, but it might suit if the heels were twisted to rest on bars.

John A. Munro, New Zealand.

A Letter from Australia—Things in this part of the globe are only so-so and in some aspects up to mud and what's in the future is pretty hard to guess. Prices of material have gone skyward (and still going strong) and will soon be in communication with "Mars." Some lines are hard to get and others can't be got and as a Consolation Prize one is comforted with the fact that prices will be higher and material harder to procure and need- less to say the high prices which have



Horse Shoeing

**Blacksmithing
Rubber Tires
Wood Work**

**Oxy-acetylene welding
all kinds of metals, is our
line.**

OLLIE C. SIMS
FULTON, MO.

A NEWSPAPER AD USED BY A
MISSOURI SMITH

to be passed on don't tend to increase business. Re: the Price Cutter:

I read the answers in the May issue of our Journal to E. J. Riddle of Utah and they read alright. My way would be to talk to the price cutter if such was possible and, if not, charge paying prices and let the cutter sweat. The more work he does the worse he will get into the mud. I have to admit of course it hurts to have work passing the door because some one else can do it cheaper and can only quote the Bible, which is "Our Journal," which said in one of the past issues.

"It was better to sit down than do \$50 worth of work and lose \$10."

The price cutter also brings another problem in his wake. Sometimes they go bung, or, as some say, "go up the spout." Some go bung two or three times and needless to add, always hit the merchants. The merchants add these losses to their cost of doing business and the Bloke who does pay his bills or accounts when due has to make up for what the other fellow did not pay. And then to cap the lot, the person, or rather the smith who does pay his way and tries to give his customers value for their money, has also to compete with the price cutter who at times winds up in the Bankruptcy Court. (So endeth the 1st lesson!)

Since writing the above epistle I received the June issue and was quite pleased with myself, also the journal when I struck page 211 with the heading "Put the Power Hammer to Work," by Will Bishop. Last week I purchased a power hammer striking a 50 pound (about \$243.00) blow and the article by Will Bishop was quite appropriate. I quite devoured the article as I have had no experience at all with power hammers, and look forward to the balance to come. He made me smile when I came across the flatter and the smile caused inquiries to be made as to whether I had a pain and

needed a hot flatter to our flatter the flatter who caused the flatter pain!

H. F. Thompson, Australia.

Another Letter and An Appreciation from Australia—Sorry to have kept you waiting so long for our subscription but the fact is we have had the hoops tightened on us since the war began, one of the sons enlisted in what was known as the wallabies and walked from here to Newcastle, nearly five hundred miles. Some months afterwards he was discharged on account of rheumatism, since then the second one has enlisted and now the third one wants to go but as he is only eighteen years of age I will not let him go yet.

I am proud of you Americans for having come to the assistance of one of the most deserving of nations and sincerely hope it will be the means of bringing those responsible to their senses.

Enclosed please find our subscription to the best journal I have ever seen for a blacksmith to read.

Josiah Williams & Sons, Blacksmiths and Engineers.

Per J. Williams (dad), Australia.

A Successful Illinois Business—The paper is fine. I will give you a description of my shop and about the way I have conducted business in the last ten years. My building is 27 x 70; lot 52 x 70. Have a ware-room on side of lot 28 x 16, so have a little corner for storage. Have three fires but use only two this year up to March 1st-18. I had two journeymen and myself but owing to conditions I reduced my help to one man, and work more myself. My business is satisfactory only at times I find a fellow you have to be very positive with. For instance: (this occurs frequently) two or three times a month a fellow will come in with a horse or some other job, usually a horse, and say: "Jack' this horse is lame a short time after being sold, Mr. so-and-so has

I cannot do your work satisfactory just take him back to the other fellow. If I shoe your horse and he doesn't go sound, about all the farmers in your neighborhood will know it by next Sunday." Then he will chew some more and I will make it very plain that there is just one way and that is what ever the horse needs, bars, rubber pads, or open shoes. It is more satisfactory as a rule and I can't remember when it was otherwise. When I get the job done my customer, because he is there, will say, "I guess that's better," and goes away satisfied. I belong to the Masters of Illinois. I have some bad competition but I get along better than the rest at that.

My tools consist of three Maure blowers, L. S. P. Calking Machine, L. G. foot rise, Wood working vise 2 B. S. vises, tire shrinker, hot and cold shear, champion power hammer, emery stand, silvers cone pulley drill, planer and pole rounder saw, L. G. disc sharpener, sickle grinder, 2 arbors, hub boring machine, tire binder and three-horse motor, line shafts, belt and I can do some business when it comes. For instance, I welded up 16-1" bolt ends on some rods in three hours, and never struck a blow with hand hammer only to straighten them a little. I came here broke ten years ago, and have never done a job without a profit since starting this business—barring some break downs. I own a good home, my business and building and a small truck farm of about two acres. I let my journeyman live there and this year we have raised, with my boys' help, all our own potatoes, chickens, milk, meat, eggs, apples, sauer kraut, tomatoes, and beans, for both families. I finance the truck business, do half the work or about. He milks and gives me half the milk; in fact we are 50-50 on it. I pay him \$13.50 per week and the man has no other expense as we just about live off the place. He has a wife and three kids and so have



MR. H. F. THOMPSON'S UP-TO-DATE VEHICLE SHOP IN FAR-AWAY AUSTRALIA

done my work," and the customer always has paid for No. 5 shoes for a No. 6 foot. Of course, I trim up the feet and lay the shoes on and say: "Brother they are too short." There the argument starts. He will say cut off the toe or set shoe back. This is the way I do it. "If the horse wasn't lame I would not get a shot at him," If

I. Of course, every body wouldn't like that kind of a deal, but I have quite a lot invested and he has a good home all for being a good boy for nine years in my employ. I think he likes the job.

Crops are good out here and we are all trying to do our bit.

J. H. Harrison, Illinois.



The Automobile Repairman

The Motor Car Paint Shop—II

A Series of Helpful Articles on Painting and Re-painting the Automobile.

Equipment

Now, as to the proper equipment of the paintshop. An upper floor with an elevator service is best for several reasons, if it is a possibility. For one thing, adequate light is essential to good workmanship. Also there is less dust to sift through from above. Many a good body-finishing job has been ruined just at the critical stage by the thoughtless jarring of the floor above. The painting department should be in quarters as nearly dust-proof as possible. Solid walls and floors and ceiling are necessary for best results. Canvas or tarpaper may take the place of plaster in the ceiling and in the walls if necessary.

Varnish and paint require an abundance of oxygen to dry properly and thoroughly. Plenty of ventilation and fresh air are thus required for good painting work, as the absence of a sufficient supply of oxygen in the painting-room has ruined thousands of painting jobs. On the other hand, draughts of cold air or even of warm air may ruin the painting job when the varnish is in its most sensitive condition, soon after being applied. A good ventilating system without draughts is thus required, and its necessity cannot be overestimated or overemphasized.

Varnish, varnish-room and vehicle must all be of uniform temperature: not under 70° and not over 75° Fahrenheit, if it can be avoided.

Courtesy, Valentine & Co.

The painting department must be well heated with a dependable heating system. Stoves may throw off gas at night, and gas is bad for wet varnish—if coal or gas-stove heat is the only kind obtainable. A stove in the finishing-room itself is a mistake. Steam or hot-water heating is the best system for the paint-room. The temperature in the painting-room should never be allowed to drop much below 70° within six or eight hours after a coat of varnish has been applied, and your heating system must be sufficiently good to provide against any such accidents.

Facilities for moving the heavy body of the car conveniently and rapidly are necessary in the motor-car paint-shop. A vacuum-cleaner is an important convenience.

Proper storage room for all accessories should be provided by the paint-shop. One plan is to have numbered bins or lockers and to give every car a number when it reaches the paint-shop, and put all accessories into the locker of that number. Then by making one man responsible for the storageroom and forbidding anyone else interfering with him, the percentage of losses is reduced to a minimum and the paint-shop is fortified against disputes with owners which must sometimes occur.

Another item of equipment frequently not found in the motor-car paint-shop is an adequate and systematically arranged stockroom for painting materials. It is not necessary, of course, to have a large room for the purpose. A closet with good shelving is all right and open shelving is very satisfactory, if protected by a screen-door that can be locked. The point is, that the stock should be kept systematically, the cans should be kept clean and free from dust, the different styles of varnish should be in different places, and the different colors, both in japan colors and in color varnishes, should be separated. There should be a record kept of all painting materials purchased and of all materials delivered to the painting-room.

Every paint-shop should always keep on hand a good supply of paint-presses, brushkeepers, brushkeeper varnish, paint- and varnish-strainers and, most important of all, brushes of all kinds in perfect condition.

Usually the best paint manufac-

turers will supply brushkeepers, paint-presses, varnish-strainers, and finishing-room thermometers without charge to all shops using their materials.

This is a very sketchy description of the proper equipment of a paint-shop. This end of the business should be left largely or entirely to the practical painter of the establishment.

A vital question to be considered is the character of work to be done in the paint-shop. If a large volume of work is to be expected or to be sought, an artificial drying-apparatus may be desired. Work may be turned out much more rapidly and economically with such an equipment. Reference is not here made to a baking-apparatus such as is used by the manufacturers in enameling hoods and fenders with black enamel. This oven requires several hundred degrees of heat and few paint-shops need it. Many paint-shops do have a large oven capable of a temperature from 110° to 120° which simply hastens the drying of the ordinary paint coat so that not more than four or five hours is required for varnish which ordinarily would not dry in less than two or three days. Such an oven would not be a wise investment for the average-size paint-shop in the smaller city or town.

Another question to be considered is that of whether to install an air-brush system or a flowing-machine system, instead of the old-style hand-painting system. These systems need only be considered by the large city shop where the volume of work may be great.

There is a difference of opinion as to the merit of the work that can be turned out with these systems. Some of the automobile manufacturers, after trying these rapid systems, have given them up and gone back to the old hand-painting methods. Others are strong believers in the machine work, especially the concerns which turn out large numbers of low-priced cars. For the average paint-shops this question is largely academic. The machine systems are beyond their needs and the old-fashioned painting methods will be found best. Fortunately, too, the best chance for the paint-shop to make real money will be in turning out high-grade work and getting a good price for it.



Gas Engine Operation Made Simple—13

The Purchase, Installation, Operation
and Troubles of a Gas Engine.

J. L. HOBBS

We are now ready to consider the gasket between the end of the cylinder and the cylinder head. For this, most manufacturers are supplying indestructible gaskets made of asbestos covered with copper, which when once placed properly in position will not cause trouble. In order to have a tight joint here, it is necessary to see that the end of the cylinder and the part of the head which fits to it are perfectly cleaned from any parts of an old gasket, or any other foreign substance. A grain of sand on one of these parts could cause it to leak. There will be observed some little grooves running in a circle on the end of the cylinder head; these should be cleaned out clean, as their office is to furnish a kind of retainer for the gasket, which keeps it from blowing out under the enormous pressure which it is supposed to hold. The pressure in a gas engine cylinder under favorable circumstances is about 325 pounds to the square inch.

An incident will be given here to show the importance of the work outlined above. A cylinder head was allowed to freeze up and burst. The owner bought a new one and was furnished with a new gasket made of asbestos and rubber interwoven with wire, which would have done the work if it had been properly handled. The new gasket was placed in position without the proper cleaning and the engine started. It made a few explosions and then ran in a sort of a half-hearted way, but would produce no power. An expert was called, who knowing that a new cylinder head had been put on and taking it for granted that the work had been done properly, did not watch for trouble there, but looked everywhere else for trouble first. No water had been placed in the water jacket, and when the engine was started dust was seen to move on the ground beneath the engine. Investigation showed that the explosion was going into the water jacket and coming out through the water pipe connection below. The new head was removed and to our surprise the gasket was found to be torn in two

by the explosion of the charge. The investigation further revealed the fact that parts of the old gasket were still on the end of the cylinder and the head which prevented them from being put together properly. This was all cleaned off and a gasket made from a piece of card board and placed in position until a new one could be procured. The engine then worked nicely and developed its full power.

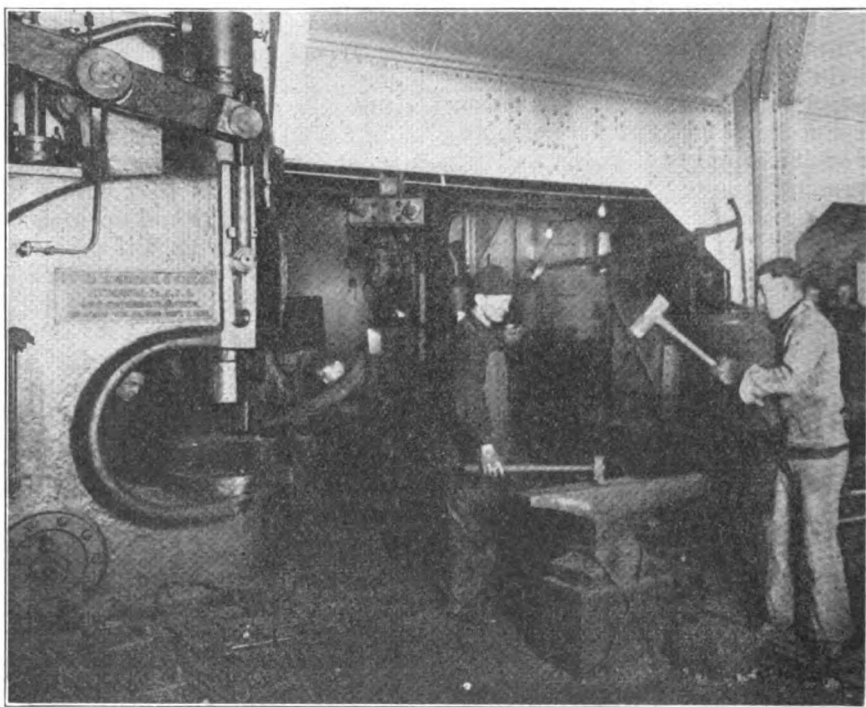
Loss of power from the explosion is not the only thing that a broken or leaky gasket will cause. If the engine should be running at the time the gasket blows out, water will be sucked in with the charge and either stop the engine or ruin the power. If the leak should not be of sufficient size to admit enough water to cause the engine to fail while running, it might when the engine is at rest; permitting enough water to seep into the cylinder to make it impossible to start the engine. A peculiar thing about the gas mixture is that it will not fire where there is moisture of any kind in liquid form. By putting a little gasoline in the bottom of a cylinder, you prevent it from firing until this is absorbed and carried out by the intake charge, this is what is meant by flooding an engine. To be a successful gas engine operator you must always be on the lookout for *little things*, as a large amount of your

troubles will be of this nature; things which are so small as to escape your notice altogether or to be unnoticed as the real cause of trouble on account of their being small.

The difference between air and water cooled engines has already been taken up in the cooling systems and will not need further attention here, but if you will read it again now you will profit thereby.

In conclusion let it be said that there is no gas engine which is in the proper condition in which its designer intended to have it, but what it will run and give every ounce of service it was designed to give. If you have followed us carefully in the explanations of the different parts of a gas engine and the workings of the different parts you will be able to locate and remedy any of the defects which have been described in these series.

It is the sincere hope of the author that he has been able to make the workings of a gas engine as simple to the reader as it has been made to him by his years of study and actual experience in the field. This series of articles was prompted partly on account of the author's own inability to get information during his first years of work with gas engines—information that would have made his work far easier to learn. If we have accomplished this for our readers we are highly repaid for the effort.



THERE ARE "SOLDIERS OF THE FORGE" AS WELL AS THOSE OF THE SEA, AND THE BLACKSMITH PLAYS AS IMPORTANT A PART BEHIND THE BIG GUNS AS THE MAN WHO DOES THE FIRING.

THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING,
VEHICLE WORK and AUTOMOBILE REPAIRING

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CO-OPERATIVE COMPETITION!

Sounds paradoxical, we'll admit; but, if made synonymous with organization, the paradox becomes clear and significant.

Such is the unusual title of a powerful preachment from the pen of Will Bishop which will appear in the January number of our journal. It is an article that will make you think, for the author digs into the long-suffering blacksmith and his ways of doing business in true Billy Sunday style. He preaches therein, not the gospel of getting the other fellow's trade by hook or crook, by knocking his business and his character, by cutting prices so that neither you nor he can make a decent living, but the creed of brotherly love in business. He beseeches the brethren of the craft to lay aside all personal antipathies in their business relations with competitors and to promote instead the spirit of Get-together for the common good of all concerned. He admonishes the members of the toiling tribe of Vulcan to organize and adjust prices which will yield to all an honest profit over the high cost-of-doing-business, to fix the length of time for credit extension, and, in fact, to do business as Big Business does: control the situation in their line in an organized business way, even though, personally, they'd like to take a poke at each other once in awhile.

It can be done. It is being done in many sections. Why not more generally? If any business man on earth needs to have this preached AT him and INTO him it is the blacksmith.

You are a level-headed, ambitious, hard-working member of the craft. You want to see conditions bettered in your vicinity—not only for the common good, but for the resulting benefits to your own business. Read this article and learn how and what can be accomplished through organization. Then, take the initiative yourself and put its preachments into effect in your community.

A CHRISTMAS GIFT THAT IS APPRECIATED

We find the following letter in our files which speaks for itself:

"If I give my husband for Christmas that which will give him the most pleasure, it will be a subscription to THE AMERICAN BLACKSMITH. Therefore please find enclosed (\$1.00) One Dollar for that purpose.

(Signed) Mrs. Earl M. Shorter,
Houstonia, Mo.

BOOKS FOR THE CRAFT

"I don't depend on books," says Uncle Billy Martin, "as much as I might, or, maybe, as much as I ought to. But when I don't know a thing and it's handy found in a book, wouldn't I be a fool for not looking it up?"

Uncle Billy is right, and his advice is the advice we would offer you. There are few branches of craft knowledge that are not covered by good books. Subscribers' Service can put you wise to the best to be obtained.

DO YOU READ THE ADS?

Do you know that the advertisements in a modern trade journal are quite as instructive and interesting as the reading pages themselves? And are you awake to the opportunities contained therein? Advertisements are veritable gates of opportunity for the wide-awake smith. Through them he will find knowledge that may mean for him a bigger success. It's a wise man who knows his craft paper, who reads it thoroughly, who reads the ads.

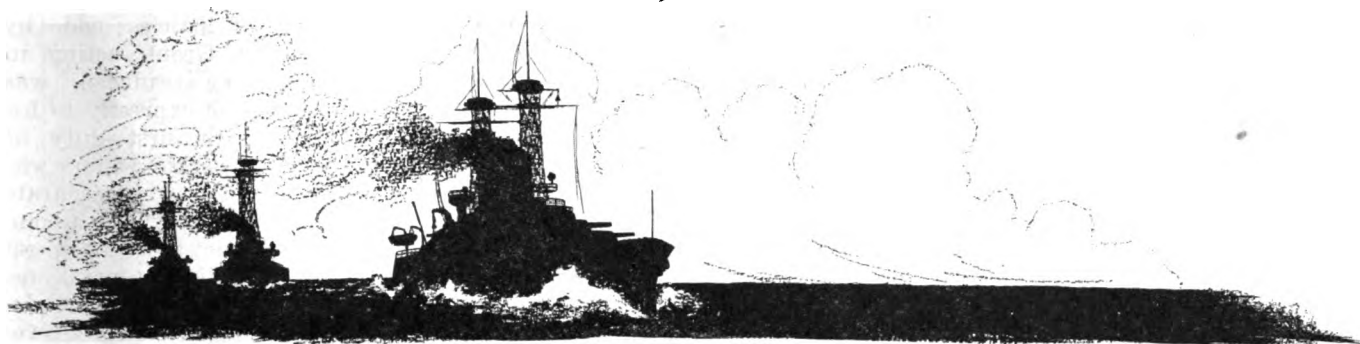
Don't give money to agents unless you are sure who they are. Every authorized AMERICAN BLACKSMITH agent will gladly show you his letter of authority to take your order. When in doubt, send money and order direct to Buffalo, N. Y.

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A LECTURE ON CONTRACTION AND EXPANSION BEFORE A SECTION OF THE NAVAL BLACKSMITHS AT DUNWOODY INSTITUTE



Training Navy Blacksmiths

How the Bluejackets of Anvil and Forge are Made Ready for the Heavy Work on Uncle Sam's Battleships

WILLARD CONNELLY, U. S. N. R. F.



HOEING sea-horses and tempering tines for the tridents of Father Neptune are the least of the arduous duties of the blacksmiths in Uncle Sam's big fleet.

Like all other blue jacket ratings, that of blacksmith, first class, can be won only after long months of grilling apprenticeship, which in war-time is intensified by compression. Day by day our fleets need ironworkers in greater numbers, need them in a hurry, though capability must not be sacrificed to time.

It is not imperative that these hundreds of blacksmiths all be trained at old-established naval schools on the seacoast. The roar of the ocean bears no relation to the roar of a forge, and hardy sailors can be made far inland. When Dunwoody Industrial Institute in Minneapolis offered its resources to the Navy Department to train blue-jackets in eleven crafts of the service, it brought to the Northwest, that region of the nation remotest from tidewater, the big human meaning of our sea-fighting hosts. The experiment has materialized beyond prospects. The first seven hundred seasoned artisans are now, in December, about to leave for their receiving ships. Vacancies will be filled immediately from the various recruiting centers in all parts of the country.

A modern sailor, a navy blue-jacket, has ceased to be a man who enlists one day and on the morrow finds himself on the ocean. He is a vocational specialist, a man who is

In true military style the Naval Training School just recently established in Minnesota has sprung up literally over night.

With no equipment but their hands and minds, the boys "fell-to" and in the short space of a week had their course in full swing.

How they accomplished it is here related.

happy to make of the navy a stepping-stone to a brightened, more useful career. If before enrolling he has not been specifically a craftsman, he at once gets the opportunity to express his preference, his selection of a trade which appeals to him—often that which he has dreamed of, perhaps, since childhood. If on the other hand he has already a calling, such as blacksmithing, he has the finest chance to pursue it and gain rapid promotion.

Dunwoody Institute is a trade school which believes in productive work for its students, not in using material for exercises whose disposition is scrap. Operating under this policy at the time the sailors came, it was peculiarly fortunate that amongst the apprentice blue-jackets were several blacksmiths possessing ten to fifteen years' accumulated knowledge of the trade. I say fortunate because then Dunwoody had no blacksmithing department. So, the method of procedure, of training the raw men, was merely to go ahead and build that department—productive instruction—under the direction of a master machinist, who was given countless valuable hints by the experienced ironworkers mentioned.

When the Bureau of Navigation authorized this training station at Dunwoody, it did not ask, in so many words, "What courses of instruction can you offer?" To start, it simply ordered about four hundred jackies to Minneapolis, directing that they be rounded out as bakers, cooks, carpenters, gas-engineers, machinists, electricians-general, electricians-radio, coppersmiths and blacksmiths. The last three departments Dunwoody lacked. But no remonstrance came from the Institute, no questions were raised. The school directors and instructors quietly pulled together with Ensign Colby Dodge, Commanding Officer of the naval detachment. Within a week every course was in full swing, and now every schedule of teaching is at the acme of its development.

To begin with, there were about thirty-five blacksmiths in the class, which is now of course much larger. Of these original thirty-five men, fifteen had known the trade from one to twenty years, and they had enlisted in the navy largely to perfect themselves or to continue their vocation. They realized their duty to their country and they preferred to serve her in that capacity in which they felt they could do the most good. The remaining men either had a superficial smattering of foundry work or a liking for it engendered by experience in a similar craft. All were tremendously eager to pound iron.

Remember that only last summer Dunwoody moved into new quarters, spacious buildings for which hardly any of the equipment had arrived.



But the war demanded speed, so the Dunwoody authorities labored day and night to rush fittings to orderly arrangement. The blacksmiths were shown a vast empty room in the basement of the main hall, a room with brick walls, concrete pillars and cement floor.

"Boys," said Mr. Grant, a master machinist appointed chief instructor of the navy blacksmiths, "here we are going to build our own shop, so if any of you ever go into the foundry business for yourselves you'll know how to do it."

"All right," said one of the older men (bluejackets may enlist between 18 and 35 years of age) "what have we got to work with?"

"Two anvils and a portable hand-forge."

"Any tools?"

"A few hammers."

"Any stock?"

"Some standard iron stock, different lengths."

"That all?"

"Nothing else—yet."

"Well, what'll we start on?"

"I want a five-fire forge and half

a dozen welding tables for the oxy-acetylene work," Mr. Grant proposed. "And while you more experienced men are building them, some of the apprentices can be making tools, and ironracks to hold the stock."

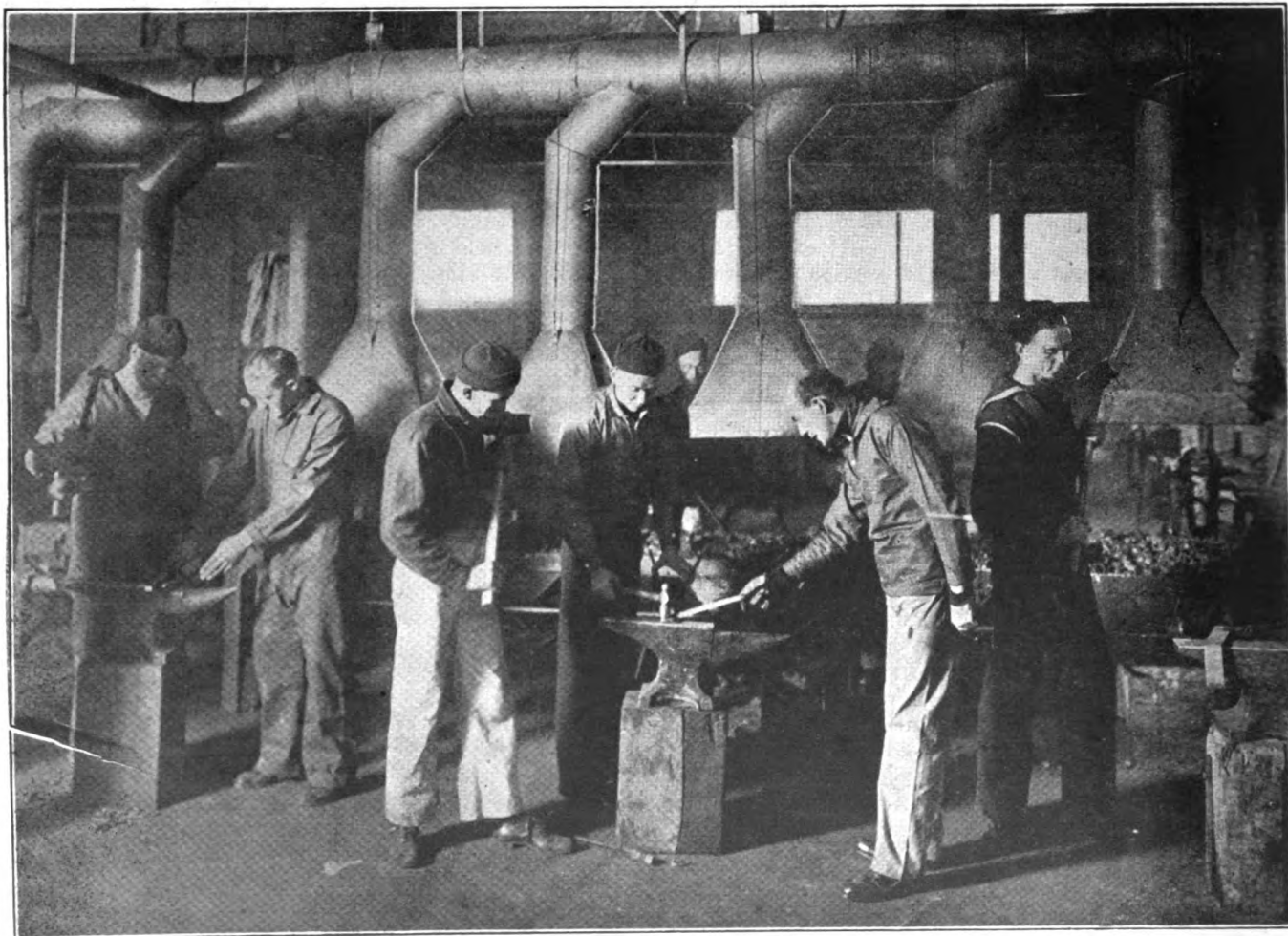
Right there was work for a month or two, beside the daily class-room instruction in metallurgy—ore treatment, blast and open hearth furnaces, steel production. Metallography, in which the juxtaposition of the iron crystals is studied under high-power microscopes, has also come to be an important and engaging study in the laboratory assays performed by the blacksmiths. And the chemistry of metals is a phase of the work to which very few of the students, even the practised hands, had given much time before coming to Dunwoody. They will go to sea more thorough tradesmen than ever.

It may be here remarked that the log-book of a naval apprentice is the most dependable indicator of his daily progress. In it he writes a record of his work in shop and class-

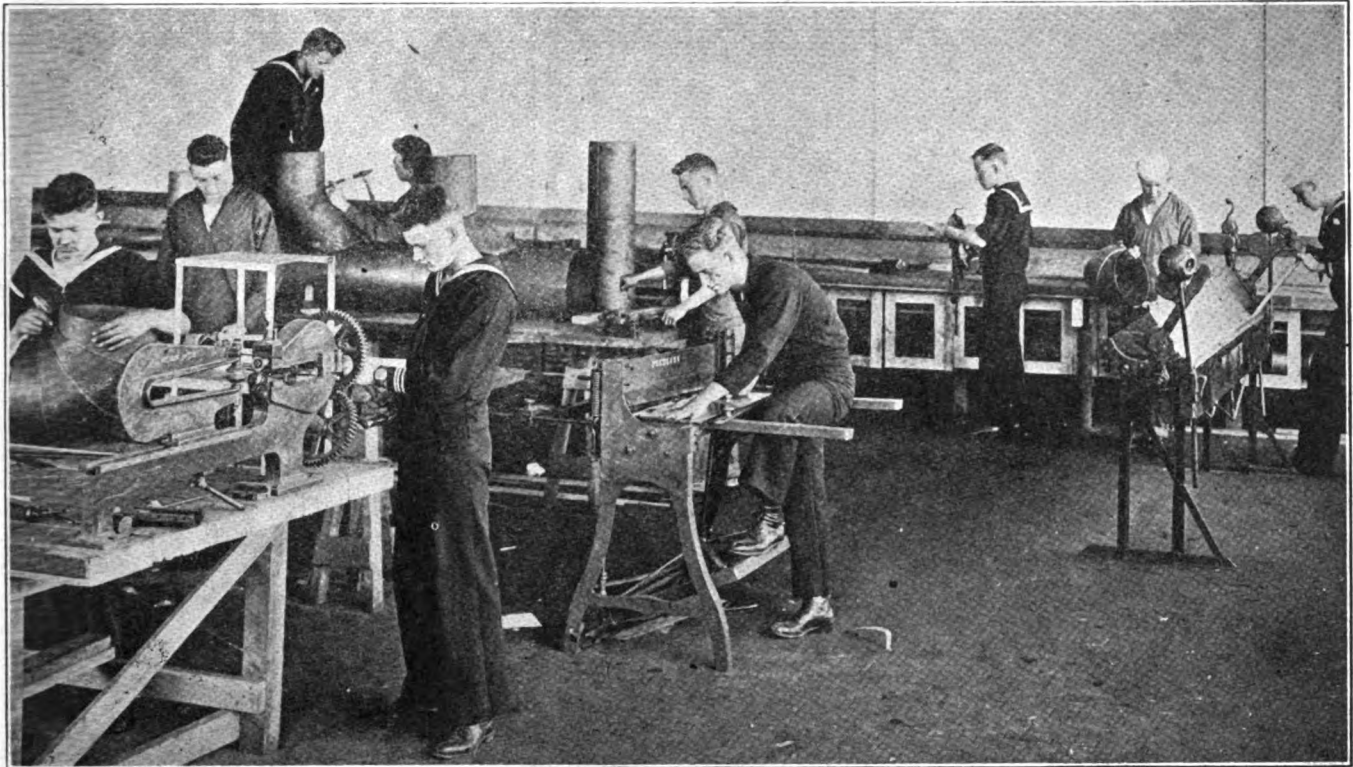
room, makes drawings of materials, of apparatus, of articles made by him. Instructor Grant, acting in accord with navy tradition, was careful to stipulate expressly to his blacksmiths that the first duty of naval men after working hours was to write in the log-book an accurate exposition of what had been accomplished that day, not to let a day get by without some distinct notations.

Some of the blacksmiths were detailed to stand guard over an aeroplane which was brought to Minneapolis in connection with the work of the Dunwoody naval aviation unit. Extremely conscientious, one of these apprentices made in his log-book an exhaustive drawing of the aeroplane, with a page of stirring comment on the hard life of a watchman.

To return to the shop, it was not long before the chief instructor put his finger on the men who actually knew blacksmithing. He found three on whose practical worth he could rely beyond all question, and them he made assistant instructors, directing each to supervise groups



THE FIVE-FIRE FORGE MADE BY THE DUNWOODY SAILOR-BLACKSMITHS. IT IS CONNECTED ON THE LEFT WITH TWO PORTABLE FORGES



DUNWOODY SAILORS MAKING THE FLUES FOR THEIR OWN FORGES

of their mates, the degree of supervision and help given to be based on individual aptitude.

First these assistants set the apprentices to making some of the needed implements, without which, they told me, a first-class ironworkers' shop would bow its head in shame. Eye tongs, bolt tongs, band tongs, square-liptongs, flat tongs, pick-up tongs, link tongs, flatters for smoothing, chisels hot and cold, swages, fullers and hardies; three to five specimens of each. And the tools worked to perfection—they could also be used quite effectively as dental instruments for elephants!

Then, hands crowned proudly with callouses, the bluejackets went at the welding tables, and built six of them out of three-angle irons butted together, without a single bolt in any. The oxy-acetylene flame did the binding. Table-tops were constructed of yellow brick.

"I don't like to see the stock scattered all over the floor," Mr. Grant objected.

By night the hustling blacksmiths had built an A-shaped iron-rack, on which they hung their strips of metal as neatly as clothes on a clothes-horse.

The five-fire forge remained to be put together and set up. Three-angle irons were again requisitioned, welded together as in the tables, but arranged in series, so that with

a white cloth over the top the job would give the appearance of a banquet board. Instead of brick, the apprentices filled in the top with concrete, scooping out five hollows like washbowls. The coppersmiths here stepped into the breach, and contributed the flues, of good sheet-iron. The compressed air pipe was extended to furnish the draft. A second portable forge with an electric blower was then added, and with seven forges, fifteen oxy-acetylene torches, and tools in abundance, the jackies cast about the shop again hungry for work.

"Now you men are going on battleships," said the chief instructor, "you are going to work on cruisers and destroyers. You must learn how to make navy parts and repairs, to remedy possible breaks in the machinery. Has anybody here ever served in the navy before?"

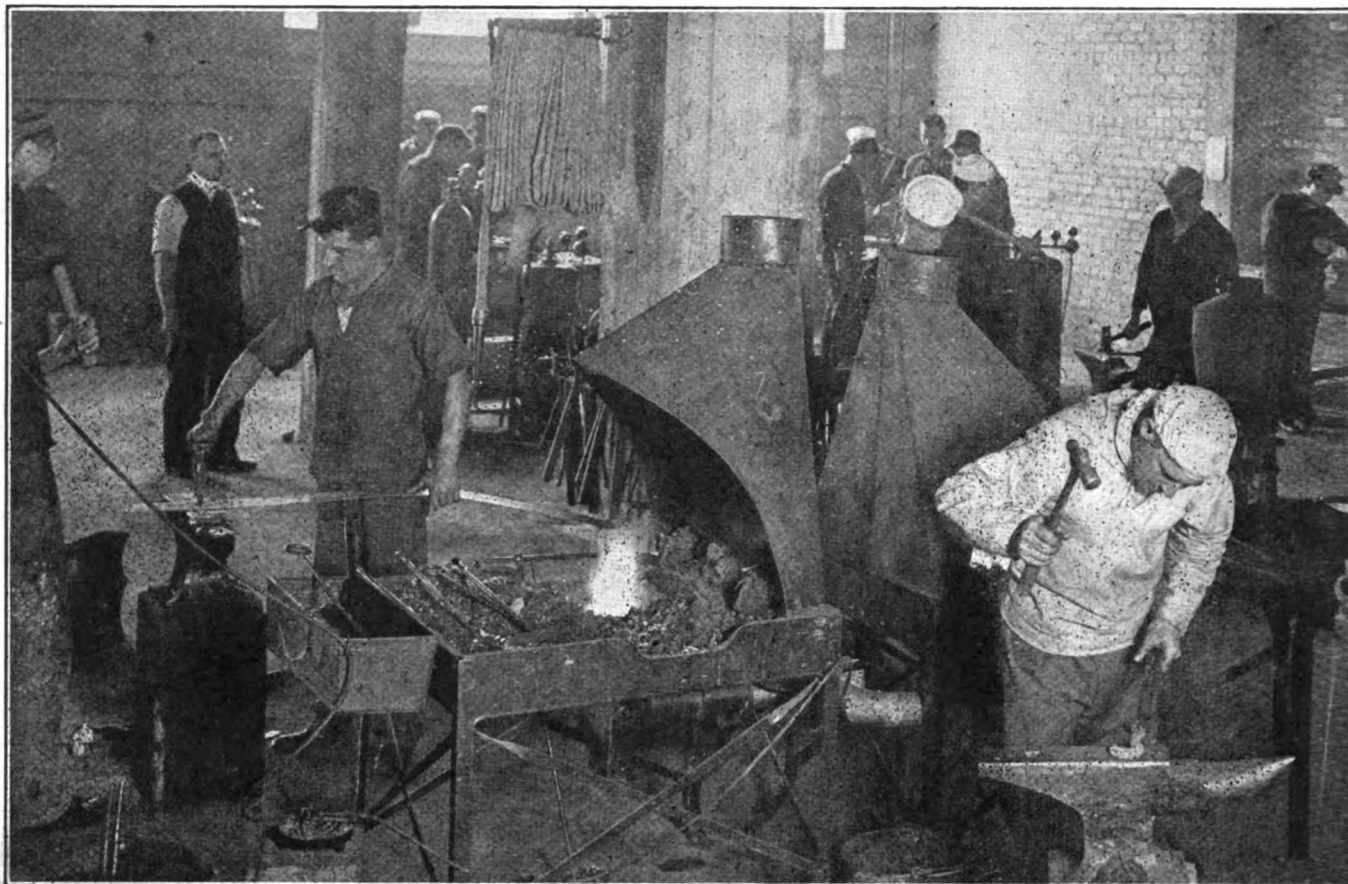
One man had, and he was one of the fifteen, almost good enough for a fourth assistant. He explained to the class what was oftenest needed aboard ship in the way of small iron parts. He took a piece of 4x4x2 stock and hammered out a finished masthead band, frequently called for at sea. He made a circular traveller to use in marking off patterns for quick jobs.

Within a week the entire class was forging ship accessories, such as swivel cleats, eye pads, sister hooks

and shackles, oar-locks, standard chains, etc.

Naturally the oxy-acetylene process is indispensable in repairing stripped gears, shafts, cams, and the like. Five tons of scrap iron were purchased by the Institute for the blacksmith apprentices to test their skill upon. An assistant instructor pulls at random from the heap, say an old gear. He knocks several teeth off it and tells the student to weld them back on with the flame. At first the jacky makes a messy job of it, as any old foundryman would apprehend. For the same reason a young surgeon is given a lifeless body to work on, and until skilled, performs no operation. But now the sailors are vastly improved, and many have shown timely cleverness. To carry on the instruction to real heavy jobs, to work, a knowledge of which would prepare a man at sea to tackle massive problems and repairs in the engine-room, was adjudged by the chief instructor to be the essential finishing touch for a first class bluejacket blacksmith. Through another clear-sighted Dunwoody policy he was able to put his scheme into effect.

He took up with the manager of the big "Soo" line car-shops in St. Paul (Minneapolis, St. Paul & Sault Ste. Marie R. R.) the matter of allowing certain of the more proficient blacksmiths in the class to



A CORNER IN THE BLACKSMITH SHOP SHOWING THE PORTABLE FORGES WHICH ARE FITTED WITH ELECTRIC BLOWERS. IN THE BACKGROUND THE BLUEJACKETS ARE BUSY WITH OXY-ACETYLENE WELDING

acquire practice in locomotive and boiler welding. This was an instance of the "extension school" system in vogue at Dunwoody. Previously the Institute had had similar relations with the Soo shops in training apprentices, and the railroad officials were glad to open the advantages of their plant to the navy. It is believed this is the first time on record that bluejackets under instruction have been tendered railroad shop privileges equivalent to work in armor-plate and ordnance foundries.

"What sort of jobs did they give you over at the Soo?" I asked Johnson, one of the bluejacket experts of the class who has been favored with the chance that promotion held in store.

"Work on boiler patches and locomotive frames," he replied.

"Welding?"

"Yes, but believe me, we wear asbestos gloves over there. It's as much different from this small welding we start the apprentices on as playing with a bear is riskier than playing with a cat."

"And have you made your welds hold?"

"Like glue," he said, with satisfaction. "If a weld is good, you

know, it is stronger than any other section of the part repaired, the same as china breaks last where it is glued."

He went on to relate how the bluejackets at the Soo shops were making a special study of expansion and contraction, of the fine points of judgment necessary to exercise at certain definite moments to keep welds from opening. He had also been "half-soling" flat car wheels and locomotive tires by the newer process in which the tire is not removed from the wheel.

"I was never able to learn much about blacksmithing out of a book," said Wilson, another of the Dunwoody bluejackets, advanced to the higher branches of the craft. "I have found it a trade calling for quick decisions and a whole lot of instinct. On certain things about iron we just have to use our judgment without always knowing the reason. If you drive a fast automobile along a narrow road and have to pass another car you simply must gauge your clearance on impulse. With the same sense you guard against an opening on a big welding job."

In the classroom talks Chief In-

structor Grant has encouraged open discussion by the more experienced jackies, who have compared and debated their views to great mutual advantage, and especially instructive has this plan been to the apprentices newly breaking into the trade. For example, Wilson, who has been seventeen years in blacksmithing, related the trouble caused by sulphur in the iron at a Montana mine where he was carrying on foundry work. He then explained the method of overcoming the impurity by the addition of salt, which precipitates the sulphur and liberates the iron in a free state.

Andersen, with a record of twenty years in forge and foundry, is the most practised blacksmith amongst the Dunwoody bluejackets. He began his trade in Sweden, and has since been engaged in iron work at sea and in a dozen or more communities across the American continent. Johnson served a long apprenticeship as blacksmith for a copper mine in British Guiana, and during that time it happened that Andersen was introducing Swedish-American forge methods in Brazil, Paraguay and Argentina. Wilson

has been an iron craftsman in Arizona, Nevada, and for a longer stretch in the coal regions of interior Alaska. At the time of his enlistment he was a foundryman in San Francisco, and he came to Dunwoody in a squad of twelve experienced blacksmiths from the Pacific coast.

These ironworkers have indeed proven themselves handy men around the Institute. Instructor Grant wanted an enclosed office in the foundry room, where he could keep his records, charts, and fine tools, and where the men could hang their dungarees after the day's work. The jackies obtained planks and 2x4's from the carpenter shop, a desk, stool, cabinet, and some hooks. In three days the office was habitable.

In one of the Dunwoody halls a motion-picture booth was wanted, from which to project educational films for civilian and navy students. The booth of course required mainly metal and asbestos construction. The blacksmiths delivered the goods in short order.

Now that practically all members of the blacksmithing class have shown such alertness and dexterity, it has developed that not only the three assistants before mentioned, but most all the rest too are competent to teach at least the first principles of the craft. The bluejackets

in the carpentry, machine-shop and gas-engine classes are all to learn the fundamentals of blacksmithing, that they may be qualified to do their own repairing. Their instructors will be their mates, the blacksmiths, many of whom will be retained for the purpose at Dunwoody through the winter.

In such manner, from meagre beginnings, the Dunwoody naval blacksmiths have assumed an importance second to none in all classes under training.

Practical Advertising Schemes for the Blacksmith

JAMES A. PATTERSON.

A young man who was learning the trade in a city blacksmith shop, which happened to be close to the stable of a veterinary surgeon, arranged to take a three-months' course of instruction from "the vet" with a view of utilizing some time later the knowledge acquired thereby. While working in the shop he learned from a customer of a hamlet in a thriving farming section in which there was at that time no shop. Acting on the hint, he visited the place two Sundays, using his bicycle. He called on a dozen nearby farmers and outlined his plans,

ten of the farmers agreeing to bring all their blacksmith work to him as soon as he hung out his shingle. As a preliminary move upon opening the shop, he wrote and had printed, a circular letter in which he told of the various diseases of the horse which he considered himself competent to treat successfully; quoting a reference from the veterinary from whom he had taken instruction. Getting a list of names from the assessor's office he mailed a circular to each farmer within ten miles of his shop. This plan afforded a good talking point and introduction—many persons bringing in horses to be treated for diseases only—and being fairly successful in this practice, he gained prestige and customers for horse shoeing and general blacksmithing who would not have come to him otherwise. He also inserted a card in the weekly paper circulating in the district. Within six months after opening the shop he was obliged to engage a helper in order to handle promptly all the work offered.

A blacksmith located at a place where there were only three houses and where the road diverged—one branch leading to a popular fishing stream, the other to a noted mountain resort, he proceeded to place a bulletin board on the V-shaped point, giving directions that would enable strangers to take the right road to reach their destination. This note appeared at the bottom of the sign in parenthesis: (*If further information is wanted, ask the blacksmith*), index finger pointing to the shop twenty-five yards from the roadside. This scheme served admirably to impress upon many travelers the fact that there was a shop at this place.

On the road formerly known as the Santa Fe Trail through a flourishing agricultural district, fifteen miles from the nearest town in New Mexico, stands a shop which has acquired a large trade in automobile repairing. Four years ago the proprietor, Alfred Rogers, then well advanced in life, seeing the trend of affairs sent his son (just out of high school) to a garage and machine shop in Albuquerque, where he spent two years in learning the essential points in automobile mechanism and repair work. Meantime the road running past the old home had been improved and became popular as a highway between two towns, forty miles apart. When the son returned an addition was erect-



WELDING WITH THE OXY-ACETYLENE FLAME ON TABLES MADE BY THE MEN. THE BRICKS ON THE RIGHT ENCLOSE A FIRE WHICH IS BUILT AROUND A LARGE CYLINDER BEING REPAIRED



ed to the original building and equipment for doing auto repair work installed. A photograph of the completed building was then taken and handed to a printer who had a cut made which he used in printing 2,000 letter-heads. A type-written form letter was then mailed to every resident within five miles who was known to have bought an automobile, telling of the young man's ability as an automobile machinist; also a conspicuous sign was placed upon the roof announcing: "Service Station and Automobile Repair Shop." Electric power was generated by a small plant on the place, used on several pieces of apparatus, and also to revolve from dusk until midnight, two facsmiles of automobile wheels studded with miniature electric lights—one on each end of the building—reminding the traveler coming from either direction, that he is within reach of help or supplies if needed.

A blacksmith located on a cross-road amidst a cluster of some dozen or more houses, 12 miles north of Denver, has a son named Albert who is attending a business college in town, and who acts as clerk and collector for his father. The boy has a pony and light buckboard. On Saturdays he makes trips to farmers who are owing bills and collects those that are due. Among the customers are many who do not have ready money when he calls; from those who have produce such as, butter, eggs, cheese, potatoes, or chickens he takes these articles in exchange at the market price which the farmer would get if he brought them into town himself; also buys outright such things as he knows that he can dispose of to advantage to neighbors, or to the one store near his father's shop. During the busy season when farmers come in irregularly, they often send in by the boy, work that is pending. In urgent cases Albert returns the job the same evening or on Sunday morning; thus saving the farmer's time. Where he is asked to make a special trip he charges a small fee for the service; also when starting on the trip, Albert calls at the post-office and takes along any mail there may be for those on whom he expects to call. Behind the buckboard seat hangs a 24 x 30-inch leather placard bearing the name of the shop. As the rig has become well-known, Albert is frequently hailed while making the circuit, and given some errand to per-

form, or a piece of work to take to the shop; thus he gets many jobs for his father that might be taken elsewhere, or be indefinitely deferred.

In the hamlet of Chivington, Kiowa County, Colo., a blacksmith named Fenwick conducted a shop.

sheriff and the smith were robust, well-developed men. The fight that followed was a hot give-and-take affair; the smith was bleeding freely from his nose; the sheriff had one eye discolored and a badly swollen upper lip. The seconds became so

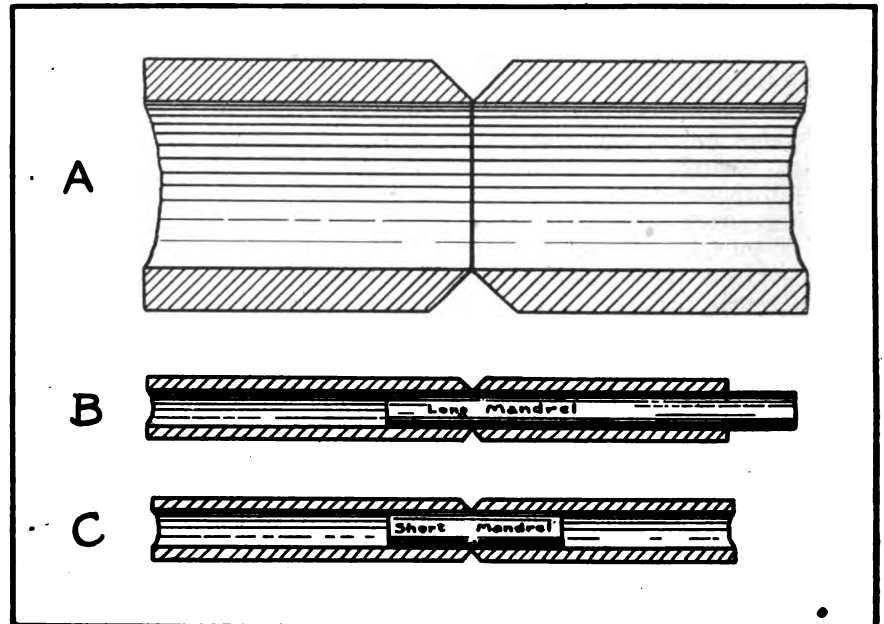


FIG. 4. A—ENLARGED VIEW OF SECTION OF TUBING SHOWING ENDS BEVELED AND SET EDGE-TO-EDGE FOR OXY-ACETYLENE WELDING; B—SHOWING HOW THE LONG MANDREL IS USED; C—WITH THE SHORT BAR

One day a horse was brought in to be shod all round by a man who promised to call for him three hours later. The man did not call at the appointed hour; but meantime the sheriff of the county called, glanced at the horse and informed the smith that the horse had been stolen and that he intended to take charge of him. A heated argument ensued in which Fenwick expressed himself thus:

"If you attempt to take that horse before I get \$2 for shoeing him, you and I will have a mixup." The sheriff, uncertain of his authority, or the proper method of procedure in such a case, banteringly replied:

"If you try to stop me I think you'll discover that you've caught a tartar." The men finally agreed to fight three rounds, Marquis of Queensberry rules; if the sheriff won he was to take the horse without paying the \$2; if the smith won he was to keep the horse until the rightful owner arrived and paid him the \$2. The men repaired to the middle of the road, the sheriff removed his coat and vest; two neighbors were persuaded to act as seconds and time keepers. Both the

intensely interested that they forgot to call time; the first round had lasted eight minutes when Fenwick landed a straight left to the jaw that rendered the sheriff *hors de combat*. The incident soon became noised around; the weekly paper published a humorous and greatly exaggerated report of the affair; lauding the smith as the proper candidate for the office of sheriff at the next election. Many farmers and ranchmen—adherents of the political party which had opposed the election of the sheriff—taking the hint in the paper seriously, came in and volunteered to vote for Fenwick in case he decided to run for the office of sheriff; others suggested that he call his place the Gladiator Blacksmith Shop. While Fenwick had no thoughts of this phase of the encounter, the ultimate result proved to be a great advertising feature for the shop, and business flourished during the next six months as never before.

Editor's Note: Mr. Patterson has described in the above article some exceedingly interesting publicity schemes for the blacksmith. Readers are invited to describe their own methods, a collection of which would be of considerable value to others.



Bending Steel Tubes—2

JAMES STEELMAN

Joining Sections

The blacksmith working with steel tubes will, at times, have to solve the problem of uniting sections either before or after bending. Perhaps the most convenient method of doing this is that which makes use of the oxy-acetylene welding process.

Let us consider first the case where tubes are to be welded *previous to bending*. We will assume, by way of illustration, that we are uniting straight pieces. First we bevel off the edges of the two ends to a bevel of 45 degrees (Fig. 4-A). The ends should fit exactly and their edges jammed sufficiently together to prevent the entrance of molten metal into the tube while welding. After jamming the ends together there will likely be more or less roughness on the inside of the tube which should be carefully cleaned off with a hand reamer.

The two pieces of work should be secured in a vise or between clamps before beginning operations with the welding torch and measures should be taken to provide for turning the tube and holding the ends in place while welding. An easy way to do this is to mount the two ends on a sort of mandrel which may be either a trifle longer than one piece, so one end of this mandrel will serve as a seat for the other piece while its opposite end serves as an aid to withdrawing the bar after welding (Fig. 4-B); or, instead, we may use a short piece of bar just long enough to provide a seat for both ends where they are to be joined and which may be knocked out afterward (Fig. 4-C). We then begin work by uniting roughly the

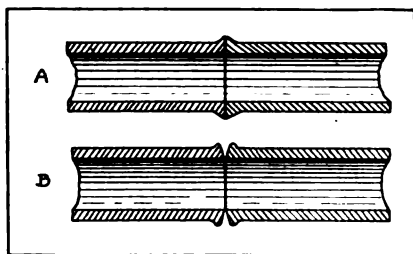


FIG. 5—TWO METHODS OF PREPARING TUBING WHERE WALLS ARE $\frac{3}{16}$ -INCH THICK OR LESS. NO WELDING-ROD IS USED

ends at three points equidistant from one another, knocking out the mandrel and then proceeding to weld the tube all round.

If the tube walls are not thicker

than $\frac{3}{16}$ of an inch, the welding may be done without beveling the ends at all and without the use of a welding rod. The ends should, in this case, be upset and then cleaned out in the bore; the object being to provide exterior ridges without, however, leaving any roughness on the inside. The two pieces of work are now jammed together, butt to butt (Fig. 5-A) and the welding carried on by heating the metal of the walls *clear through*. The heat must be just sufficient to bring the inside edges of the joint to the melting point.

We may bring still heavier tube walls within the scope of this method by the double operation of upsetting and beveling. The beveling need not be much of a departure from the ordinary plain edge. The object is to provide a sufficiently open groove when the two ends are together to enable the operator to get a melting heat clear to the bottom. The amount of upsetting will naturally vary with the amount of beveling. The two ridges are to supply material to fill up the groove and finish off the weld. That is all. So we bevel and upset just enough to accomplish the heating and the filling (and finishing) (Fig. 5-B).

The work of welding tube ends together may be aided by the use of asbestos strips wound round the ends, one strip to one side of the weld and the other strip to the other side (Fig. 6). The object of using such strips is to prevent the radiation of heat from the work to either side of the joint. The loss of heat by such radiation will then be made up by heat from the joint and this last loss by heat from the welding flame. However, if there is no trouble in driving sufficient heat clear through the tube walls without the use of the asbestos, then naturally it may be omitted.

Whatever mode of procedure be employed, if the work is done right, then we will get a fine joint. If full strength is important and it is not desired to have a rounded ridge all round the finished work, then we must anneal. This should be done with great care and in accordance with modern methods of annealing.

Where the welding is done *subsequent to bending*, it may be impossible to use a steel mandrel, short or long. In such a case, we may use a plug of wood. If the wood is fairly hard—maple, for example—it may resist the heat of the welding operation long enough to cover the

case. However, we may if we choose wrap the plug with asbestos cloth. The plug may be removed by heating the work in the region of the weld, and then knocking out the charred material.

If the smith is not equipped with a suitable gas-welding outfit, he may weld tube ends by the more usual means of the ordinary blacksmith's welding.

But in case he uses the oxy-acetylene torch, he should bear in mind

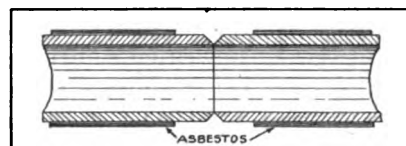


FIG. 6—SECTIONAL VIEW OF ENDS READY TO WELD TOGETHER WITH ASBESTOS STRIPS IN PLACE

that he may save money by handling the work just right. Oxygen and acetylene are expensive gases. It is often the case that the torch need not be used on the work at all for the early part of the heating. The two ends of the tubing may be preheated in the forge or by the use of a cheap gas flame.

Verbal Contracts Do Not Protect the Seller

RALPH A. BUTZ.

A large number of important business transactions occur every day in which the oral contract is relied upon as being entirely sufficient. Oral contracts are usually considered binding where the transaction concerns a promise to sell or deliver goods, and the buyer agrees to accept and pay for them. Under this form of contract the seller is the party who suffers in most instances, for he has nothing more than the buyer's mere verbal promise to fulfill certain obligations. Of course, there are also cases where the buyer is the loser, for it may be impossible for him to compel delivery of the goods contracted for, through which condition he may sustain a loss.

The reason why so many sellers still place their confidence in oral contracts is probably because they have not been forced to test the validity of these contracts, or required to produce sufficient evidence that a contract was actually entered into. When the buyer states that he did not enter into a contract for the purchase of goods, and the seller has no written evidence to substantiate



his claim, he will then realize how difficult a matter it is to present sufficient evidence to the court in proof of his claim. Even where the seller can prove that the buyer entered into an oral contract, the buyer still has many chances of escaping liability.

The importance of putting contracts into writing cannot be emphasized too much, whether they fall within the terms of the statute of frauds or not, for a written contract is absolute proof of the promises made by both parties, while the validity of an unwritten contract is in many cases not established except after costly litigation.

The fallacy of relying upon an oral contract was demonstrated quite forcibly to the seller in the following instance:

In this case Hammond, the seller, entered into an oral contract with Blickford, the buyer, to deliver a carload of material at Blickford's warehouses. Hammond performed his part of the contract faithfully and shipped the material as agreed upon. When the car arrived at its destination the railroad company promptly notified Blickford of its arrival. Blickford refused to receive and accept the material because he discovered later on that he could purchase similar material at a reduced price. The railroad company, after holding the car for some time, finally transferred the material to its terminal warehouses.

Hammond brought suit to recover the value of the material and to enforce Blickford to perform his part of the contract. Hammond was not allowed to recover, and the reasons given by the Court will apply to thousands of other cases where oral contracts are in controversy.

The Court said: "While the proof shows that the defendant in this case verbally agreed to purchase the material, upon certain terms and conditions disclosed by the record, there is no evidence whatever from which a jury would be warranted to find an actual acceptance and a receipt of the material sold by the verbal contract, as would gratify the plain provisions of the statute, and would constitute a valid and enforceable contract of sale."

In order to illustrate what the Court means by "actual acceptance and receipt of the material," we give below that part of the statute of frauds relating to this class of contracts. This statute has been enacted in nearly all states and in almost

every instance contains similar provisions:

"A contract to sell or a sale of any goods or choses (things) in action of the value of fifty dollars or upward shall not be enforceable by action, unless the buyer shall accept part of the goods or choses in action so contracted to be sold, or sold and actually receive the same, or give something in earnest to bind the contract, or in part payment, or unless some note or memorandum in writing of the contract or sale be signed by the party to be charged or his agent in that behalf.

"There is an acceptance of the goods within the meaning of this

Do Your Part to Help Win the War

Hoover asks you to Observe the Following Rules—

1. *Food will win the war. Don't waste it.*
2. *Conserve food, especially beef, sugar, fats and wheat.*
3. *Use less wheat and meat. Buy local foods. Serve just enough.*
4. *He who wastes a crust of bread prolongs the war.*
5. *Save the food and help the fighter fight.*
6. *Use substitutes for wheat and help win the war.*
7. *Fat is fuel for fighters. Save it.*
8. *Eat wisely and keep the wolf from the door of the world.*
9. *Eat at least one wheatless meal a day.*
10. *Do not eat meat more than once a day.*

section when the buyer, either before or after delivery of the goods, expresses by word or conduct his assent to becoming the owner of those specific goods."

In another case in which an oral contract was involved, and in which the buyer was not bound because he did not accept the goods, the Court said: "The statute does not speak of delivery, but superadds to the delivery which the common law requires acceptance of the goods, or some part of them by the purchaser. It confers upon the buyer alone the privilege to prevent a consummation of the contract by refusing to accept and receive the goods. While there can be no acceptance under the statute without delivery by the seller, yet there must be both delivery and acceptance in order to sustain an action upon the contract. In order to satisfy the statute there must be a delivery of the goods with

intent to vest the right of possession in the vendee, and there must be an actual acceptance by the latter with intent to take possession."

A Place for the Trained Man in "The Army Behind the Army"

Your Opportunity and Your Duty to Back Uncle Sam

Skilled men in a great many lines of trade are urgently needed at this time in bringing to full strength the necessary quota of men for the Enlisted Ordnance Corps of the National Army. Unless the man in the front-line trench has behind him the skilled co-operation of the Nation's specialists, his work is seriously hampered. It is to give him this help that the "Army behind the Army" is maintained.

What the Enlisted Ordnance Corps Is

The Enlisted Ordnance Corps, National Army, into which the Ordnance Enlisted Reserve Corps has been merged, is charged with the supply, maintenance and repair of all cannon and artillery vehicles and equipment; all machines for the service and maneuver of artillery; all small arms, ammunition, harness, motor trucks, motor cycles, tractors and railroad cars; it is, in fact, an Army behind the Army, commonly known as "Service of the Rear."

Type of Men Wanted

There is a place for practically every man who knows a trade in the Enlisted Ordnance Corps. *Machinists, Mechanics, Plumbers, Painters, Carpenters, Canvas Workers, Saddlers, Auto Mechanics, Blacksmiths and Wheelwrights* are especially needed at this time. It is to the best interest of the Nation that each man does the work for which he is best fitted, thus saving the Government a long period of instruction, and, also greatly increasing his own chances for advancement in rank.

Applicants must be between 18 and 40 years, citizens or declarants, and be able to speak, read and write the English language, should have no absolute dependents, and must be able to pass a physical examination conforming to that prescribed for the Regular Army.

Place and Type of Service

If accepted for enlistment, men will ordinarily be sent to an arsenal school for a period of instruction, on completion of which they will be assigned to detachments, units, or organizations, with ultimate service



abroad. Previous military training, while preferable, is not essential, as men will continue the work which they pursue in civil life.

Pay and Grade

In view of the importance of their work a large number of men will serve as non-commissioned officers. Original enlistment is required as private, but later courses of training or special qualifications quickly lead to higher grades. Pay ranges from \$30 to \$97.20 a month, depending upon demonstrated ability and place of service. *Men enlist for duration of war only.*

Free quarters, rations, clothing, bedding, medical attendance, etc., are provided.

Relation to the Draft

Men registered under the Selective Service Law may voluntarily enlist prior to the posting of their names by their Local Boards. No man who has been called to appear for physical examination is eligible for enlistment in any branch of the military service. In case such men do enlist the department under which they have enlisted will be requested to discharge them and direct them to report to their local boards.

How to Enlist

Get application blank by writing to Chief of Ordnance, Enlisted Personnel Division, Washington, D. C. Fill it out, return to Chief of Ordnance, and if there is an opening for you at the time, authorization will be sent you to enlist at the nearest recruiting station, and if accepted there, free transportation will be provided to place of service.

Welding Large Spur Gears

ELMER E. WHITE

The writer was once located near three large paper mills and had occasion to do a considerable amount of welding of heavy parts. A modern paper machine turns out the finished product at the rate of five to six hundred lineal feet per minute and in order to dry this as quickly as is necessary, it must be passed over many heavy steam-heated iron rolls. These are usually driven by large spur gears which are placed on the back side of the machines and, on account of the heavy duty which they are called upon to perform, they frequently crack in the rims.

Before oxy-acetylene welding came into general use, these gears were taken to the junk pile and new ones substituted. Naturally this occasioned a tremendous loss to the

paper makers. Now oxy-acetylene welding is employed to restore them and a great saving is thus effected.

I have welded an average of three of these gears per week and naturally became quite expert in handling

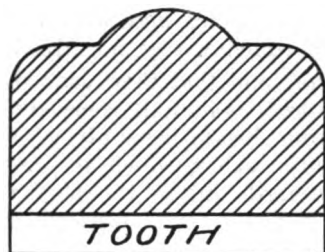


FIG. 1—CROSS-SECTION VIEW OF TOOTH

work of this special character. As others may be up against more or less similar problems, I will describe in detail the methods which I followed.

The gears were about five feet in diameter and the rims five and one-half inches wide. Between teeth, where the break always occurred, the depth was three and one-half inches with a section like that shown in Fig. 1. They weighed over five hundred pounds.

I constructed a special reinforced concrete forge measuring about four and a half feet square with an opening in the center six inches deep and eighteen inches in diameter.

The first thing I did was to prepare the break. This was accomplished by fastening the gear on its edge with the crack at the bottom and, with a large cold chisel and a man to strike, chiseled the crack open on the inside of the rim so the opening would be at least three inches on the inside and nearly through to the bottom of the teeth. Fig. 2 will illustrate the appearance of the gear as it looked when ready to weld.

By means of a short track above and a half-ton chain-fall, the gear was raised above the forge (with the crack down) and lowered carefully to rest on two blocks of iron—one on each side of the break.

A large weld of this kind must be preheated a red heat for fully a foot on each side of the break. Charcoal should be used and the preheating will take about two hours. I piled half a bushel of charcoal well around the rim, using no blast but simply soaking it with coal oil, lighting, and, after it was burning brightly, covering with heavy asbestos paper to hold in the heat. I would put on more charcoal frequently until the gear was heated sufficiently to weld.

In making such a large weld I always took the precaution to wear a pair of heavy gauntlet gloves and had someone working with me who would wet them occasionally with cool water and also wipe the perspiration from above my goggles. These precautions are almost a strict necessity as a heavy job like this requires from one to one and a half hours to complete and the heat is intense.

I found a No. 10 tip and a three-eighth inch filling rod the best, welding together several filling rods previous to going ahead with the job.

When all was ready, I removed the charcoal over the break and covered the fire on one side of the gear with several thicknesses of asbestos paper. I then proceeded with the actual welding operation, being careful to melt down the sides, and allowing the end of the filling rod to rest on the bottom and playing torch around it. With care I could build up the side next to me almost square and even. It is necessary, in handling a weld like this, to step from side to side and when the fill is

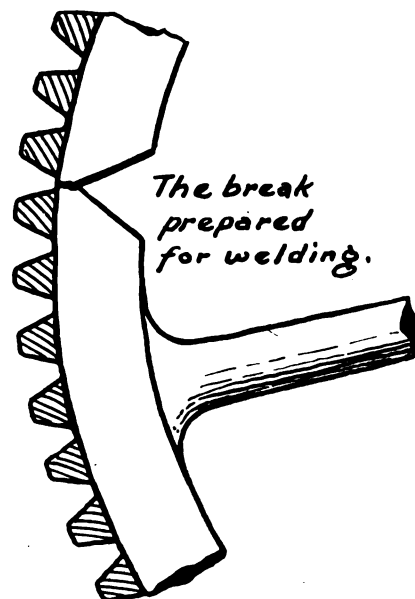


FIG. 2—SECTION OF GEAR SHOWING BREAK AFTER IT HAS BEEN PROPERLY PREPARED FOR WELDING

up even or a little higher, to allow the gear to tip down by lowering a bit on the chain-fall, finish up the side and tip the gear over the other way and finish the opposite side in like manner.

My price for one weld was ten dollars but I always felt my price was too low. Any person who tries welding one of these large gears will think so too!



Case-Hardening Oxy-Acetylene Repairs

J. F. SPRINGER

The more carbon steel contains, the harder it will be even in the annealed state, up to a point where the carbon content is about 0.90 per cent. And the more carbon contained, the harder we may make the steel by heating and quenching. But, when steel is very highly heated, the contact of oxygen with its surface will usually result in burning out more or less of the carbon content. This is exactly what occurs when we use the oxy-acetylene welding process and it is important to know how to properly harden the metal after our work is finished with the torch.

The edges of the old metal have to be heated very near the melting point in order to provide a plastic surface to which the material from the welding rod may attach itself. The work is therefore heated up to a rather high temperature in the neighborhood of the weld and is apt to lose a large percentage of its carbon at that point. Also, the material which is being added from the welding rod is apt to be robbed of much of its carbon; or, it may contain little in the first place, as in the case where Swedish or Norway iron is used.

Hence, it will be seen that when we employ the process of oxy-acetylene welding, we are producing in and around the weld a condition of reduce carbon percentage and this is a condition, that in certain classes of work, becomes a very important matter.

Let us take the case of gear wheels, for instance, where we are replacing or building up broken, chipped or cracked teeth with the welding torch. The new or repaired teeth will be short of carbon, therefore difficult or practically impossible to harden.

It is essential in most cases where gears are employed, that their surfaces be sufficiently hardened to withstand the wear and tear of engaging with the teeth of adjoining gears. So we must find some means of impregnating the surfaces of the repaired teeth with enough carbon so we can heat and quench and obtain the desired hardened surface.

We accomplish this by case-hardening, which is a simple process of adding a quantity of carbon to the surface of the work and producing a "case" or shell of say a depth of 1/64, 1/8, 3/16 of an inch, or more,

as desired, the underlying material remaining practically free from additional carbon. In the case of gear teeth, the result is a very tough interior, able to withstand the stresses and strains incident to engaging with other gears and with a hard surface which withstands the wear.

Understand that this case-hardening process does not complete the hardening itself; it simply adds the necessary carbon which is preparatory to hardening by the usual processes of heating and quenching.

There are various ways to case harden and we will proceed with the simplest methods:

An old way, and a very good one, is to pack the articles in a metal case, the packing material consisting of something containing carbon. When the articles have been properly packed, the lid is put on and the whole is put into an oven or furnace. A very suitable material for packing is made by grinding or pulverizing bone-charcoal. The bone dust thus produced contains a good deal of carbon. When the case containing the bone dust and the articles is heated up to a pretty high heat, the bone dust gives off carbon. Some of this enters the highly heated steel and penetrates a slight distance. The packing loses carbon and the steel gains carbon. Chopped leather is also a suitable material for the packing. In fact, almost anything can probably be used that will yield up its carbon upon being heated. But against some things, certain objections might be cited. Some substances, when brought into contact with highly heated steel, produce damaging results. Consequently, we may have to be on the lookout lest our packing material may also give off such damaging substances. We can, in fact, hardly be too careful about the selection of this packing material. The bones of animals used simply in a ground state, are probably as good as anything as they are free from injurious substances and easy to obtain, and quite inexpensive. Wood charcoal is also good, being practically free from impurities. But it has the disadvantage of producing very little effect upon the metal when used alone and where only comparatively thin shells are to be produced. By thin, we mean having a depth of less than 0.04 inch. But where the impregnation is to extend itself rather deeply into the work, which will be the case with fairly large gears, wood charcoal (powdered), combined with other

substances according to the following recipes, will be found to be a most excellent material. A considerable amount of time is required to complete the hardening and the resulting hardness (after heating and quenching are completed) is of moderate degree and tough.

Recipe No. 1.

Wood charcoal, pulverized 10 ounces
Kitchen salt, pulverized 1 ounce
Sawdust 15 ounces

For thin impregnations, we may secure good results by combining as follows:

Recipe No. 2.

Wood charcoal, pulverized 9 parts
Kitchen salt 1 part

Instead of kitchen salt, we may substitute *barium carbonate* and get a still better mixture. The action of the mixture of barium carbonate and pulverized wood charcoal is very even and it retains its strength for a long time. After having used the mixture, we may spread it out in a thin layer and expose it to the air. The barium carbonate will then absorb from the air a proportion of what it lost when being used. The mixture will, after having been used a number of times, require a replenishment of its wood charcoal. The following recipe is a very suitable one:

Recipe No. 3.

Wood charcoal, pulverized 3 parts
Barium carbonate 2 parts

The barium carbonate is a cheap chemical. It may be obtained in the form of a fine powder. If secured in the natural state, it will be necessary to pulverize it before mixing it with wood charcoal. The natural form is called *withelite*. To go about making the mixture, proceed as follows: First, have ready the wood charcoal in a granulated form and the barium carbonate in a finely pulverized condition. Then mix the two as well as may be. Finally, grind the mixture for the purpose of pulverizing the charcoal and of carrying the mixing process still further. Be careful to use the proportions of 3 parts charcoal to 2 parts barium carbonate rather exactly. A change in the proportions will produce a substance which will be less effective in making a rich impregnation.

Two other good recipes follow:

Recipe No. 4.

Oak charcoal, pulverized 5 parts
Leather charcoal, pulverized 2 parts
Lamp black 3 parts

Recipe No. 5.

Beech charcoal, pulverized 3 parts
Horn charcoal, pulverized 2 parts
Bone charcoal, pulverized 2 parts



Considerable judgment and skill must be exercised in handling the various jobs which will come into the average shop. What works for one job may be unsuited for another. The reader is assumed to be fairly familiar with the nature of the metals which he may be handling; also skilled in the tempering processes which would naturally follow the case-hardening. Experimentation with old, worn-out gears or pieces of scrap is advisable in any case.

Old Time Method of Boring Shot-Gun and Musket Barrels

L. R. SWARTZ.

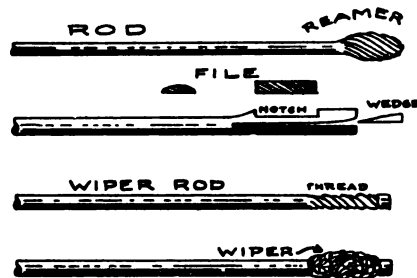
The gun barrels that were made in the United States during Colonial days were manufactured pretty much after the fashion of Moon-Shine Whiskey in the mountains of Kentucky today; that is, under Colonial laws it was considered an illicit business. The English government intended that guns, cutlery, hardware, etc., should be made in England and shipped to the colonies in British ships. Consequently the manufacture of such things in the colonies was put in the same class with smuggling. For that reason the old boring mills were set up in out-of-the-way places along what was then the Frontier. The same is true regarding the "forges" which rolling mills have replaced in making wrought bar-iron, and the first charcoal blast furnaces.

As to the tools and processes in use for the making of gun barrels at that early day, but little is known to me. The earliest authority I have, is "Hazen's Panorama of the Professions and Trades," edition of 1845, which gives the process of barrel making then in use at "The Harper's Ferry U. S. Armory." This authority tells us that musket barrels are welded up over a mandrel from bars of iron drawn out to suitable shape on an anvil. The bars are of such width as to give a lap of half an inch for the weld with the weld running lengthwise to the barrel. The shaping and welding is done on an anvil having several grooves on its face suitable for shaping different sections of the barrel.

It then goes on to say that the barrels of Fowling Pieces are made in the same way, but that after being welded some are heated for a space of 6 or 8 inches, one end fastened in a vise and the heated part twisted until the length of the bar-

rel is gone over; such barrels being known as "twist" barrels. Still another sort of barrel is described as being made by welding together pieces of iron, 8 or 9 inches long, so that the welds run both longitudinally and laterally.

From the foregoing it will be seen that all musket and shot gun barrels were forged hollow like pieces of "lap welded" pipe are made today.



THE "TOOLS" USED BY MR. SWARTZ FOR BORING SHOT-GUN AND MUSKET BARRELS

The process of boring was to use several bits each a little larger than the one preceding it; the last bit being the exact size of the calibre intended for the barrel.

It is evident that this description must have been written at an earlier date than 1845; because in it there is no mention of percussion caps which were in use about that time. "Cornstock's Natural Philosophy," written a little later, describes the process of manufacture of percussion caps; also Sharpe's Breech loading rifle and Col. Sam. Colt's revolving pistol; closing up the topic with the statement that "with the advent of such improved and efficient weapons of destruction, the day is not far distant when 'man shall study the art of war no more.'"

This latter work has passed out of my possession.

After the barrels had been bored the breech screw was fitted and the vent bored, to admit priming and firing, and the barrel was loaded with powder and ball. The powder charge was equal in weight to the ball; equivalent to about 5 service charges of powder. This was fired and the barrel examined for defects. If the barrel stood these proof charges it was finished and polished or browned, and, in some factories, stamped with the "proof mark."

Considering that the twist drill was not in general use at that day, if in use at all, there must have been a lot of labor wasted where the boring was done by hand.

All the boring of gun barrels I saw done was with a sort of relief reamer (see cut) formed on the end of a steel rod of about $\frac{3}{8}$ " diameter. They were all bored from breech toward the muzzle by hand with a brace or sweep.

Some men pushed the reamer in boring the barrel, others passed the rod through the barrel and pulled to keep the reamer cutting. The latter claimed they could make a truer job of boring in that way. No matter how they did the boring they afterward finished the inside of the barrel with "Freshing Files" which were sections of half round file set in a hickory rod and pushed back and forth through the barrel to true up and burr what the reamer may have left (see cut).

After breech-loading shot guns came into use, some of these old gun smiths "freshed out" breech loader barrels in the same way but changing the form of the rod at the end which held the file. Some, after freshing, further finished the bore of barrels for both breech and muzzle loaders with emery or anvil scale finely pulverized.

Whether emery or anvil scale was used, a good tow "wiper" was made on the end of a rod after it was passed through the barrel a few times to give it "set." Whatever abrasive was used was powdered over the wiper and the wiper run back and forth through the barrel until it was smooth inside.

For barrels with "choke" the wiper was not fitted as solid as for others. That is, the tow was a little "springy" so that it would compress when smoothing the choke and expand when smoothing the larger part of the bore.

Gun-smiths had as varied ideas on these matters of boring and finishing as blacksmiths have today on horseshoeing or tire setting. I suppose all of them were right in their way; at any rate I have seen some of these old guns that would out-range and out-shoot most of the so-called "finest" breech-loaders we have today.

Your Business

Your first and biggest business today is to help Uncle Sam make war in order to make peace.

No matter what your business or occupation may be nor what your predilections and beliefs, all trade, all industry, all prosperity in this country depend upon free and peaceful co-operation between the citizens of a free and united Nation.

—The Optimist.



The Horses

WILLIAM F. KIRK, in *New York Journal*.
They cheered for the soldiers in bristling
review,

With their buttons and knapsacks and
guns;
There were wives who postponed the last
cheerful adieu

And mothers who wept for their sons.
There were kisses for the brave volunteers
And praise from the flag-waving throng,
But who in the groups cheered the four-
legged troops?

—For the horses were going along:

Oh, yes, for the horses were going along,
And proudly they pranced in review,
The high-stepping bay and the roan and
the gray,

Their bridles all shiny and new.
They didn't know when they would charge
with the men,

Or what they were hurrying for,
They didn't know why they were hearing
"Good-bye!"

But the horses were going to war.

No epaulets gleamed on the trappings they
wore,

Each horse ranked as high as the rest;
But true to the trust of the soldier he
bore,

Each charger was giving his best.
True friends to the mortals who watched
them go by,

Light-stepping and willing and strong,
Their hearts beating proudly, their heads
carried high,

The horses were going along!



Heats, Sparks, Welds

There's not much left of nineteen-
seventeen.

"And so," as Tiny Tim observed, "God
Bless us, Everyone!"

A very Merry Christmas to you, Brother
Reader. May it be joyful, prosperous, and
filled to overflowing with good things and
the promise of many good things to come.

And don't forget to write it 1918 after
this month has passed into Eternity!

Pink Buffaloes are fine for the Holiday
Season. Better send for a herd today and
have 'em ready for use on your Christmas
greetings, packages, etc.

Binders for back numbers will put your
copies of Volume sixteen in shape for
ready-reference and will preserve them
from damage. The Book Department will
gladly supply you for a small sum.

Now that mottoes and good resolutions
are in order, here's one well worth-while
thinking over—and adopting: Cultivate
despatch; it's the man who gets things
done who gets ahead.

If you want a second helping of beans,
join the Army!

A coat of whitewash is a great little
cheer bringer in the shop during the long,
dull winter days. And the time to apply
it is NOW.

Safety devices always pay full measure
in the long run. The worker who must
keep one eye on his machine to prevent
losing a finger or an arm, cannot turn out
as much nor as good work as the chap
who can devote all of his attention to his
work and knows that with reasonable
care his fingers are safe. Besides, a lost
finger can never be replaced once it's gone.

Why is it that folks try to stop leaks
in the roof by covering the shop with a
mortgage? Usually, when there are leaks
in the roof, there are also leaks in the
business; a mortgage stops neither. It's
best to find the leaks—and do it in time.

The higher prices that the farmer now
has to pay for new equipment is going to
lend a zest to his plans for repainting and
repatching such implements and machinery
as he already possesses. Before the winter
is over there is going to be a regular
paint-up and patch-up season and you
should come in for your share of this
profitable business. It's a good time for
you to advertise—right now.

Make this your harvest month for col-
lections. The farmers in your section
have harvested and sold their crops—and
never before have they sold at such prices.
They have plenty of money in the bank
and now is the time for you to get busy
and collect what is owing you.

Speaking of profits in automobile re-
pairing—Ole says, "Ay get along yust fine
wit my tractor till someting rubbed the
ensilage off the maggot wires and then ay
crank and crank and have hal of time and
notting doing, so ay send for an expert
and he charge me twenty-five dollars yust
to bandage up two little wires. Ay tank
ay bane robbed!"

It's a sound business principle to pur-
chase in quantity lots and thus take ad-
vantage of the saving afforded thereby.
Do thou likewise when you renew your
subscription to "Our Journal." Read the
Honor Roll—note the substantial saving
in long-term subscriptions and observe
how many brother readers have placed
their names here. Then think it over.

The following was overheard in Si
Perkins' store t'other day: "You farmers
buy a good many gold bricks." "Yas, and
you city fellers buy a good lot of swamp
land. I guess things are 'bout even." But
nothing was said about the poor, strug-
gling blacksmith who seems to get both
for some reason or other.

Wish that neighbor smith o' yours a real
Merry Christmas by handing him a copy
of Our Journal. We'll send you an extra
copy, gratis, for the purpose. And if
you get him to subscribe for a year, and
thus bring him into our big family of
readers, we'll give you six months' extra
credit on your own subscription account.

Did you ever notice how many others
send in letters to the Editor? Last month,
for instance. Take a look at "Queries,
Answers, Notes" Department—observe the
letters from far-away countries, note the
timely kinks, the helpful price lists, the
valuable suggestions—and ask yourself,
"When am I going to send in something?"

Here
you see

THE AMERICAN
BLACKSMITH'S
Christmas Tree.

One of the best type, too.

And while, Dear Sir, 'tis
not a fir—yet it was made
"fir" you. 'Tis true, you see
upon this tree no presents rich and
rare; yet please be kind and bear in
mind, in wish the gifts are there.

We wish you all, the short, the
tall, young, middle-aged and
gray, the rich, the

poor,
white,
black,
and Moor,

A Merry Christmas Day

Good shop pictures are always accept-
able. And if a description of the equip-
ment accompanies them with perhaps a
diagram or two of its layout, so much the
better. The 1918 Shop Number will be
here before we know it and if you have
the kind of a shop that is a real credit to
the craft, have a picture made of 'er and
send it along.

Someone has said that there are three
classes of men: mind workers, machine
workers, and won't workers. Honestly
now, to which class do you belong? If
you're still in the second class, are you
laying plans for stepping up into the first?
Use your head man, that'll get you there
in a jiffy. It's head work that counts
these days.

Advertising is the connecting link be-
tween the blacksmith and an ever advanc-
ing standard of efficiency. Advertising
brings the markets of the world to your
shop. The advertisements in "Our Jour-
nal" bring equal opportunity to every
blacksmith. The smith in a remote district
can look over the advertising pages and
thereby be nearly as close in touch with
the latest developments in shop machin-
ery, etc., as his brother in the larger cities.
If you profit from these pages of The
American Blacksmith, read also the ad-
vertisements. It's a habit that will "get
you there."

Do you realize that the modern smith
needs to know more and more every day
to keep up with the procession of progress?
Look back twenty years for example. In
comparison with today the smith required
to know little beside how to work his bel-
lows and pound iron. Today, there are
more brands of steel than a smith can
count on fingers and toes and as many
ways of working them, to say nothing of
the modern appliances and methods that
are continually coming into use.

Another year has passed and what have
you done with it? Have you put your
business on a sound, workable basis where
you know your costs; have you reached
out for that ever-growing and lucrative
automobile trade? In a word, have you
taken advantage of the opportunities that
have surrounded you on every side? Bet-
ter get busy this coming year. Observe
your local conditions, read your craft pa-
per, study its timely suggestions and
apply them, read the ads—send for the
profit-bringing trade catalogs, advertise—
and make a start right now. That big-
ger success—the success you deserve, you
can command if you will.

Our Honor Roll

A RESOLUTION.

This time of the year seems to be the accepted time for the preparation of resolutions for adoption at New Year's. The following resolution is accordingly suggested: Resolved: That I will send in my order for a long-period subscription to The American Blacksmith—"Our Journal"—before January 1, 1918.

For—Be It Known that by so doing I will—1st, Save Money—2nd, Save Time and Annoyance—3rd, Insure My Subscription and 4th, Help Reduce the High Cost of Living.

To This Resolution and for these reasons I willingly subscribe; setting down my hand and seal this December, 1917.

Let us know where you stand on this resolution. We want every reader of "Our Journal" to get the full advantage of Our Long-Time Rates. Why shouldn't you subscribe at the lowest rate you can possibly get? The money-saving you make is very considerable; why not put that money in your own pocket? We're willing.

U. S. and Mexico

2 yrs.....	\$1.60 and save \$.40	\$2.00 and save \$.50	10 sh. save 2 sh.
3 yrs.....	2.00 and save 1.00	2.70 and save 1.05	14 sh. save 4 sh.
4 yrs.....	2.50 and save 1.50	3.20 and save 1.80	18 sh. save 6 sh.
5 yrs.....	3.00 and save 2.00	3.75 and save 2.50	22 sh. save 10 sh.
10 yrs.....	5.00 and save 5.00	7.00 and save 5.50	42 sh. save 22 sh.

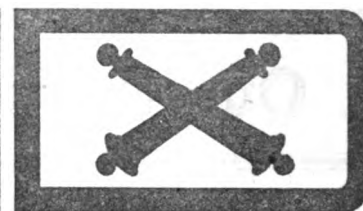
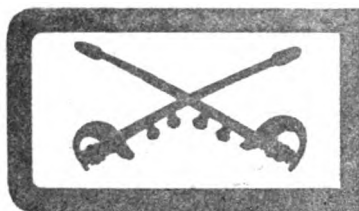
Canada

Other Countries.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no better time than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
H. E. Pass, Minn.	Dec., 1941	Williams & Turner, W. Va.	Dec., 1925
E. A. Krebbel, Kans.	May, 1937	J. J. Devine, N. J.	Dec., 1925
The Fix-It Shop, Utah.	July, 1935	P. Nelson, Minn.	Dec., 1925
J. A. Torrey, Mass.	Dec., 1933	M. Kennedy, Tas., Australia.	Dec., 1925
W. C. Watt, Kansas.	Dec., 1930	H. Jones, England	Dec., 1925
C. J. Vanblad, Pa.	Mar., 1929	A. J. Wassmuth, Idaho	Nov., 1925
I. J. Stites, N. Y.	Jan., 1929	J. G. H. Mallett, Queens, Australia	Nov., 1925
A. J. Brookman & Co., Aust.	Sept., 1928	A. W. Spell, Ohio	Nov., 1925
Waddington Farm, W. Va.	Mar., 1928	W. R. Clepper, Texas	Nov., 1925
A. MacLean, Ont., Can.	Feb., 1928	G. H. Isley, Mass.	Nov., 1925
C. Forrest, Cal.	Dec., 1927	L. Krause, Ind.	Oct., 1925
S. Frey, Ind.	Dec., 1927	Reynolds Brothers, Pa.	Sept., 1925
E. Lewis, Iowa	Dec., 1927	F. W. Krenz, Calif.	Aug., 1925
Plattau Shoeing Shop, Colo.	Dec., 1927	C. E. Allen, Nebr.	Aug., 1925
W. A. Wilson, N. Z.	Sept., 1927	Halvorsen Bros, S. D.	May, 1925
F. C. Bock, Nebr.	Aug., 1927	A. E. Spangberg, Oregon	May, 1925
W. W. Egly, Pa.	June, 1927	D. M. Kille, Okla.	Apr., 1925
C. Stebbins, Jr., Kansas	May, 1927	G. Gullgren, Iowa	Apr., 1925
J. Brennenman, Va.	May, 1927	G. Fredericks, Minn.	Mar., 1925
B. Forman, N. J.	Apr., 1927	V. Priessnitz, Wisc.	Mar., 1925
H. Dyresen, S. D.	Apr., 1927	E. Price, Illinois	Feb., 1925
G. Shoemaker, Pa.	Mar., 1927	D. C. Garber, Ohio	Feb., 1925
C. Geiger, Penn.	Mar., 1927	J. H. Kurk, Illinois	Feb., 1925
F. Everts, Conn.	Mar., 1927	E. R. Hiteshue, Ohio	Feb., 1925
P. Flanagan, Cal.	Mar., 1927	H. F. Schreiber, Pa.	Feb., 1925
J. Peterson, Iowa	Mar., 1927	J. S. Damm, Iowa	Jan., 1925
A. Tillman, Calif.	Feb., 1927	J. M. Withers, Hawaii	Jan., 1925
J. W. Haught, Ill.	Feb., 1927	W. Herdt, Ky.	Dec., 1924
F. Roschy, Pa.	Feb., 1927	D. Teeblen, Nebr.	Dec., 1924
J. W. Howes, Md.	Feb., 1927	N. B. Quirk, Pa.	Dec., 1924
W. Stocker, Texas	Feb., 1927	F. H. Jarvis, Indiana	Dec., 1924
W. Pontius, Iowa	Feb., 1927	George Tatum, Jr., Fla.	Dec., 1924
M. Goller, Pa.	Feb., 1927	I. Clark, Va.	Dec., 1924
A. A. McLean, Nev.	Feb., 1927	A. N. Estes, Va.	Dec., 1924
C. M. Adams, Conn.	Jan., 1927	J. Bailey, Manitoba	Dec., 1924
C. Radeleff, Iowa	Jan., 1927	E. G. Naylor, Md.	Dec., 1924
P. J. Kauth, Ill.	Dec., 1926	P. Schicks, Washington	Nov., 1924
A. H. Gooding, S. Aust.	Dec., 1926	H. E. Snyder, Oregon	Nov., 1924
A. Granadam, Ill.	Dec., 1926	J. A. Stewart, Ky.	Oct., 1924
C. J. Hale, Wash.	Dec., 1926	C. Richenbecker, N. Y.	Oct., 1924
John H. Schneider, Cal.	Dec., 1926	W. L. Bertholf, N. J.	Oct., 1924
J. C. Smith, Washington	Dec., 1926	J. W. Hewson, S. Africa	Sept., 1924
H. Grimm, Utah	Dec., 1926	Ed. Larson, N. D.	Sept., 1924
F. Harding, Iowa	Dec., 1926	R. T. Monk, Illinois	Sept., 1924
F. L. Matlocks, Ark.	Sept., 1926	W. T. De Young, Illinois	Sept., 1924
B. B. Jones, Wisc.	Sept., 1926	C. W. Taylor, Pa.	Aug., 1924
J. Taylor, Calif.	Sept., 1926	Charles Wells, Colorado	Aug., 1924
W. H. Branch, N. C.	Oct., 1926	H. G. Weaver, Pa.	Aug., 1924
J. Clarke, Jr., Queens, Aust.	Aug., 1926	Working Men's College, Vict.	June, 1924
J. Boles, Ohio	July, 1926	F. M. Kenoyer, Nebr.	June, 1924
J. A. Buchner, Mich.	July, 1926	O. Anderson, Ariz.	May, 1924
H. Mitchell, N. Y.	July, 1926	R. C. Frederick, N. D.	May, 1924
M. Broton, N. D.	June, 1926	H. L. Fenton, New Mexico	May, 1924
A. Schmitt, Nebr.	June, 1926	J. Carl, Iowa	May, 1924
D. Ackland & Son, Man.	May, 1926	J. E. Little, Pa.	May, 1924
H. Piret, Ore.	May, 1926	H. I. Brenzle, N. Y.	Apr., 1924
J. Sinclair, W. Australia	May, 1926	W. E. Parr, Iowa	Apr., 1924
P. Sowa, Oregon	May, 1926	F. Sramek, Nebr.	Apr., 1924
W. H. Dignan, S. Australia	Apr., 1926	L. A. Hulen, Calif.	Apr., 1924
P. A. Peterson, Iowa	Apr., 1926	J. Sparks, Va.	Mar., 1924
G. F. Bowers, Okla.	Apr., 1926	J. E. Ray, Minn.	Mar., 1924
W. Pocheln, Oregon	Mar., 1926	A. Hulstrand, N. D.	Mar., 1924
A. Garver, Ohio	Feb., 1926	W. F. Seibert, Calif.	Mar., 1924
C. Burton, Mass.	Mar., 1926	P. F. Seibert, Calif.	Mar., 1924
J. Murphy, Calif.	Jan., 1926	H. Roeschwetter, Mo.	Mar., 1924
J. F. Murphy, Nev.	Jan., 1926	W. B. Briant, N. J.	Mar., 1924
F. Karsner, Illinois	Jan., 1926	A. Bosch, N. Y.	Mar., 1924
J. N. McIntire, Pa.	Jan., 1926	D. Van Valkenburg, Mass.	Feb., 1924
W. Post, N. Y.	Jan., 1926	A. R. Johnson, R. I.	Feb., 1924
Powell Brothers & Whitaker, England	Jan., 1926	F. Jacobs, Ohio	Feb., 1924
O. Temple, Idaho	Jan., 1926	A. J. Perry, Illinois	Jan., 1924
N. Karpowicz, S. Dak.	Jan., 1926	E. K. Walker, Calif.	Jan., 1924
B. L. Lahn, N. Y.	Dec., 1925	H. D. Erskine, Vermont	Jan., 1924
J. A. Hulvey, Illinois	Dec., 1925		

NAME	Subscription Paid to	NAME	Subscription Paid to
E. Fowler, Pa.	Jan., 1924	W. Parks, Ohio	Jan., 1923
Breen & Son, Ireland	Dec., 1923	U. Dammann, Minn.	Jan., 1923
M. Lamoreaux, Ohio	Dec., 1923	O. Stenning, S. D.	Jan., 1923
C. R. Davis, N. Y.	Dec., 1923	W. Claffey, Illinois	Jan., 1923
F. W. Copeland, Kansas	Dec., 1923	J. Wedwick, N. D.	Dec., 1921
J. L. Tomlin, Kansas	Dec., 1923	J. Williams, Australia	Dec., 1921
H. A. Davis, N. Y.	Dec., 1923	C. Beggs, Alaska	Dec., 1921
E. H. Troyke, Illinois	Dec., 1923	J. J. Klima, Nebr.	Dec., 1921
D. B. Johnson, Iowa	Dec., 1923	J. Boyer, Mich.	Dec., 1921
J. M. Karer, Ohio	Feb., 1923	C. F. Shaw, Man., Can.	Dec., 1921
S. Horton, Calif.	Nov., 1923	W. Blaker, Ohio	Dec., 1921
J. Spratt, Mass.	Nov., 1923	W. Lamberton, N. Y.	Dec., 1921
F. Watkins, N. H.	Nov., 1923	Schenley & Schmitt, Pa.	Dec., 1921
F. Koppnis, Ala.	Nov., 1923	O. Furry, Kans.	Dec., 1921
Y. C. Liernert, S. Australia	Oct., 1923	E. A. Pierson, Okla.	Dec., 1921
W. B. Abell, N. Y.	Oct., 1923	J. Robertson, Scot.	Dec., 1921
A. J. Brookman & Co., Vict., Australia	Sept., 1923	J. Lauer, Mo.	Dec., 1921
W. R. Turner, Man.	Oct., 1923	A. Brause, Ohio	Dec., 1921
C. Nelson, Nebr.	Sept., 1923	B. A. Abbey, Ohio	Dec., 1921
J. Hughes, Ohio	Aug., 1923	J. Ingvarson, Minn.	Dec., 1921
H. M. Anderfuren, Calif.	Aug., 1923	A. F. Millebrandt, Mich.	Dec., 1921
Camp Brothers, Texas	Aug., 1923	J. H. Teufel, Jr., Illinois	Dec., 1921
L. C. Larson, Iowa	July, 1923	E. C. Brown, Mo.	Dec., 1921
S. Effenar, South Africa	July, 1923	C. Beyer, N. D.	Dec., 1921
G. L. DeWitt, Mont.	July, 1923	G. Nichols, Okla.	Dec., 1921
W. W. Gregg, Texas	July, 1923	F. H. Joahn, Mass.	Dec., 1921
W. R. Stroupe, N. C.	July, 1923	J. B. Scheidter, Indiana	Dec., 1921
O. C. Young, Michigan	June, 1923	J. H. Ickes, Pa.	Dec., 1921
Otto Sippel, Pa.	June, 1923	E. Willis, Colorado	Dec., 1921
A. Chapman, N. Y.	June, 1923	J. W. Gorton, Ark.	Nov., 1921
C. Birely, Md.	June, 1923	A. Elliott, England	Nov., 1921
F. H. Shupe, Pa.	June, 1923	J. Beam, N. J.	Nov., 1921
J. C. Storer, Pa.	Apr., 1923	F. Kolarik, Iowa	Nov., 1921
W. Schoonover, Pa.	Apr., 1923	A. McNab, Scotland	Nov., 1921
J. M. Rumlre, Iowa	May, 1923	J. Delane, Nebr.	Nov., 1921
Lanadale Brothers, Mo.	Mar., 1923	A. Marks, N. S. W., Aust.	Nov., 1921
J. Carswell, Ark.	Mar., 1923	O. R. Stevenson, Ill.	Nov., 1921
G. E. Glaxier, Ohio	Mar., 1923	J. Meier, Minn.	Nov., 1921
F. Gath & Co., S. Africa	Mar., 1923	J. O. Aitkin, Aust.	Oct., 1921
T. Bradley, N. S. Wales	Mar., 1923	W. Knouff, Ala.	Oct., 1921
L. T. Needham, Illinois	Feb., 1923	O. M. Johnson, Miss.	Oct., 1921
G. C. Distinger, Miss.	Feb., 1923	J. K. Gilnicki, Mich.	Sept., 1921
J. Wieber, Minn.	Jan., 1923	H. Feldus, Nebr.	Sept., 1921
Z. A. Enos, Minn.	Jan., 1923	R. Murray, Calif.	Sept., 1921
W. G. Wice, Calif.	Jan., 1923	A. Hammond, Calif.	Sept., 1921
F. S. Bishop, South Africa	Jan., 1923	P. Wedel, Kans.	Sept., 1921
J. Curran, Arizona	Jan., 1923	J. Ackerman, Indiana	Sept., 1921
S. P. Harney, Mont.	Dec., 1922	A. Harper, Mont.	Aug., 1921
W. Breckner, Okla.	Dec., 1922	L. E. Bonton	Aug., 1921
J. Pabina, Nebr.	Dec., 1922	C. Pearce, Australia	July, 1921
J. Gold, Alta., Can.	Nov., 1922	J. Watson, S. Africa	July, 1921
B. A. Steink, Ohio	Nov., 1922	R. Goldschag, S. Africa	July, 1921
Shepard & Son, N. Y.	Nov., 1922	C. Hammerstram, Minn.	July, 1921
P. Frederickson, Iowa	Nov., 1922	A. S. Pratt, New York	July, 1921
L. O. Leuire, Illinois	Nov., 1922	E. H. Spain, Ariz.	July, 1921
W. Lawson, New Zealand	Nov., 1922	L. H. Strange, Vict., Aust.	July, 1921
S. Shields, Kans.	Oct., 1922	T. Watson, Aust.	June, 1921
W. O. Grant, Calif.	Oct., 1922	W. Urquhart, New Zealand	June, 1921
W. H. Miller, Iowa	Oct., 1922	W. Voigt, S. Africa	June, 1921
I. Sproul, Me.	Sept., 1922	J. M. Werli, Pa.	June, 1921
J. S. Lee, Wash.	Sept., 1922	E. Toll, New Zealand	June, 1921
A. O. Martin, Idaho	Sept., 1922	W. K. Bell, Ark.	May, 1921
O. A. Mortimer, Idaho	Sept., 1922	A. Guettler, Texas	May, 1921
H. J. Hyatt, Washington	Sept., 1922	G. Johnson, Kans.	May, 1921
J. N. Skow, Iowa	Sept., 1922	S. Budds, New Guinea	May, 1921
A. D. Standiford, Washington	Sept., 1922	H. Baker, Australia	May, 1921
T. Temklewetz, Quebec	Sept., 1922	F. E. Smith, Vermont	May, 1921
Clark & Fauset, Aust.	Aug., 1922	A. J. Hatch, Maine	May, 1921
A. Pellifer, Ohio	Aug., 1922	W. Cornwell, Pa.	May, 1921
W. D. Valentine, Iowa	Aug., 1922	W. F. Kline, Kansas	May, 1921
H. Devonshire, N. Z.	July, 1922	J. Kirkbride, N. J.	May, 1921
E. T. Cull, Ky.	July, 1922	Thos. McNeill, Scotland	May, 1921
G. Hoffman, N. Y.	July, 1922	T. Holloway, Kans.	Apr., 1921
J. Erman, Ark.	July, 1922	W. Winget, Vt.	Apr., 1921
W. R. Gelling, Australia	June, 1922	J. A. Johnson, N. D.	Apr., 1921
W. K. W. Hansen, Pa.	June, 1922	D. H. Laird, N. Y.	Apr., 1921
Robert Tochter, Calif.	June, 1922	A. J. Prue, N. Y.	Apr., 1921
J. Van Marter, N. Y.	June, 1922	C. A. Butler, Ohio	Apr., 1921
A. Olson, Minnesota	June, 1922	E. Mosser, Queens, Australia	Apr., 1921
Otis Alman, Mich.	June, 1922	J. Laux, Oklahoma	Apr., 1921
E. Schnelle, Ohio	Apr., 1922	C. L. Cease, Pa.	Mar., 1921
J. Bunker, Iowa	Jan., 1922	E. Lindblad, Nebr.	Mar., 1921
F. Norrie, Yukon Ty.	Jan., 1922	F. Bowen, N. Y.	Mar., 1921
J. Needham, Kans.	May, 1922	W. F. Tippee, Mich.	Mar., 1921
E. Anders & Son, S. Aust.	May, 1922	J. T. Rehm & Son, N. Y.	Mar., 1921
Louisa Carriage Works, Va.	May, 1922	W. C. LeBow, Mo.	Mar., 1921
S. Wilkin & Sons, N. Y.	Apr., 1922	William Pate, Mo.	Mar., 1921
R. H. Kuhrt, Iowa	Apr., 1922	A. T. Jameson, Colorado	Mar., 1921
S. Smith, Texas	Apr., 1922	C. Alexander, N. Y.	Mar., 1921
E. Burrows, Eng.	Apr., 1922	J. Fencil, Wisc.	Mar., 1921
A. J. Neill, Vt.	Mar., 1922	H. Cornils, Oregon	Mar., 1921
W. Muecke, Ontario	Mar., 1922	C. Schmid, Nebr.	Mar., 1921
M. Burke, Ariz.	Mar., 1922	J. Schwarzmann, D. C.	Mar., 1921
J. W. Hodge, N. Y.	Mar., 1922	M. Stettner, Minn.	Mar., 1921
J. W. Haar, La.	Mar., 1922	Elmer Wetzel, N. J.	Feb., 1921
D. W. Smith, Rhode Island	Mar., 1922	J. Potthoff, Nebr.	Feb., 1921
E. A. Dillon, Nev.	Mar., 1922	N. E. Hart, Okla.	Feb., 1921
D. F. Kuster, Washington	Mar., 1922	C. Knudson, Iowa	Feb., 1921
C. A. Whitacre, Ohio	Mar., 1922	S. Button, Kans.	Feb., 1921
J. Poettgen & Co., Missouri	Mar., 1922	N. F. Hartsoe, Mo.	Feb., 1921
W. T. Long, Colo.	Feb., 1922	I. Geopbre, N. C.	Feb., 1921
C. Robertson, S. Africa	Feb., 1922	R. E. Worthington, N. Y.	Feb., 1921
J. Zavadnik, Kans.	Feb., 1922	B. E. Doggett, Kansas	Feb., 1921
P. C. Oldroyd, Utah	Feb., 1922	Shellhaas & Fry, Colorado	Feb., 1921
V. Vanouret, Wisc.	Feb., 1922	J. Toees, Kansas	Feb., 1921
W. Parker, Mich.	Feb., 1922	J. W. Wilson, Mo.	Feb., 1921
J. DeGlonner, Mich.	Feb., 1922	W. T. Wilson, Indiana	Feb., 1921
Nordstrom Bros., Kans.	Feb., 1922	J. Schmid, Nebr.	Feb., 1921
G. F. Johnson, Michigan	Feb., 1922	E. Sles, New York	Feb., 1921
J. Schoenberger, Ohio	Jan., 1922	A. R. Skerritt, New York	Feb., 1921
A. Burnett, Pa.	Jan., 1922	W. H. Starkey, Kans.	Feb., 1921
R. H. Keith, Iowa	Jan., 1922	W. Singleton, Pa.	Feb., 1921
		E. N. English, Iowa	Jan., 1921
		H. Becker, Ill.	Jan., 1921



The Army Horseshoer.

8. Working and Shaping Iron

As a preliminary to instruction in shaping and preparing a shoe for the foot, it is best for beginners to learn the method of making and shaping a plate shoe, using an old shoe as a model.

The various parts of a shoe are commonly spoken of as follows: The *toe* is that portion between the first nail hole on one side and the first nail hole on the other side. The *quarters* are the portions in which the nail holes are punched. The *heels* are the remaining parts of the shoe. A *side* is one-half of a shoe and includes one heel, one quarter and one-half of the toe.

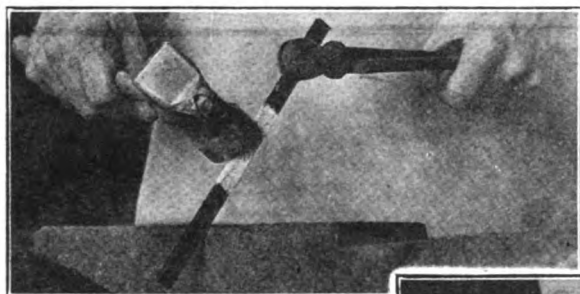


Fig. 1—The first step in bending: strike lightly with hammer at center of the upper edge of bar.

The plate shoe is made of $\frac{1}{2}$ by $\frac{1}{4}$ inch steel which is much more easily worked than the heavier service shoe.

Take a bar of metal about 11 or 12 inches in length.*

9. To Bend the Bar, Where the Center of the Toe Will Be.

Place the bar in the fire so that the center is directly over the draft. The coals of a properly-made fire should hold the bar about 6 inches

*The length of bar required to make a shoe for a foot will be found by measuring in a straight line on the sole of the foot from the edge of the wall at the center of the toe to the extremity of either bulb of the frog. A little more than twice this distance will be the length of the bar required to make the shoe.

above the twyer ball. When cherry red, remove from the fire, holding the nearest end with the tongs and lean the other end on the edge of the anvil farthest from you. The bar is held on edge and at an angle of about 45 degrees with the face of the anvil.

Strike lightly with the hammer at the center of the upper edge of the bar, and gradually bend the bar until it is right angled or L-shaped. (Figs. 1 and 2).

If, after bending, the L is not flat, but twisted, it must be leveled on the face of the anvil. (Fig. 3).

Remember to use only light blows on red metal. Heavy blows leave irregularities that are difficult or impossible to remove.

10. To Shape One Side.

Place one-half of the L in the fire and when heated seize the cold half with the tongs and

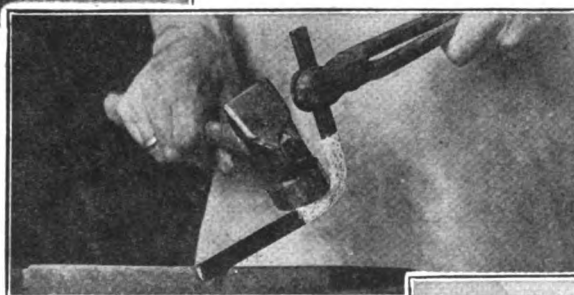


Fig. 2—The second step in bending: gradually bend bar until it is L-shaped.

hold the heated side diagonally over the horn on the anvil, the left hand near the base and held low, the heated end projecting about an inch over the horn. (Fig. 4).

Begin striking at the end of the heated portion and, keeping the right hand steadily in position, shape the steel by gradually moving it beneath the hammer. (Fig. 5). Move the steel over the horn by raising

the left hand and carrying it toward the point of the horn; that is, as the toe is approached, shift the work toward the point of the horn.

The horn of the anvil is so constructed (Fig. 6) that the diagonal curve across the center conforms to the shape of the heels and quarters of the average sized foot and the curve near the point is shaped like the toe. For a very large shoe begin near the base of the horn.

To shape the opposite side, proceed in the same manner.

11. To Center the Toe.

After both sides have been turned, see if they are of equal length; that is, see if the toe is in the center. If not, then heat the toe, and grasping the longer side with the tongs, hold the shoe over the point of the horn so that it is correctly centered and strike just beyond the horn. (Fig. 7).

12. To Draw Out the Heels.

Heat the heels to a white heat. Hold the shoe on the horn in the same position as for shaping and upon a diagonal that will insure close contact. The blows, however, are struck on the part resting on the horn and the heel is brought toward the hammer by lowering the left hand. (Fig. 8).

In drawing out the heels the lower (or ground) surface of

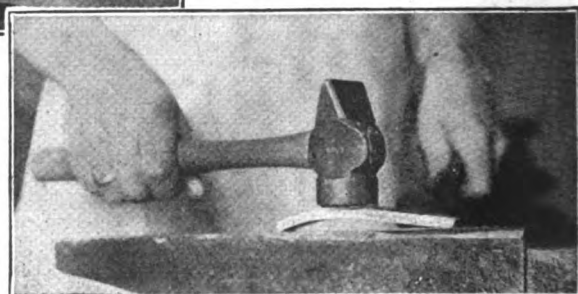


Fig. 3—After bending, if bar is twisted, it must be leveled on face of anvil.

the shoe should be made slightly narrower than the upper (or bearing) surface.



Notice that to draw out one heel the ground surface is on the left side when the heel rests on the horn. (Fig. 9).

To draw out the other heel the ground surface is on the right side up, and the shoe is changed to the opposite diagonal of the horn.

In both cases strike on the edge of the ground surface, and as a result this surface will be the narrower.

For a left-handed man these positions will be reversed.

This drawing out narrows and at the same time thickens the heel. To restore it to its original thickness, work on the face of the anvil. Hold the ground surface down so as to preserve the bevel. (Fig. 10).

13. To Cut Off the Heels.

Apply the shoe to the model and note how much must be cut from the heels. Care must be used, however, not to cut them too short. It is better to have them too long and to cut them off again if necessary.

After heating to a white heat, place the ground surface on the hardy (Fig. 11) so as to cut the heel off squarely, but hold the toe slightly lower so that the cut will also be beveled: that is, so that the upper surface will be slightly longer than the ground surface. The cutting will widen the steel near the end.

To bring it back to the original width hold the inside edge on the heel of the anvil and strike on the outer edge. (Fig. 12).

This will also point the heel slightly and diminish the work of hot rasping. (See paragraph 14 for details of hot rasping).

In fitting a plate shoe for a foot the nail holes should be punched before cutting off the heels so that if necessary the toe can be centered to correspond to the nail holes.

14. Hot Rasping.

The heels are now finished by hot rasping. (Fig. 13). The shoe is placed in the vise with the ground surface toward you, and the heels are rounded, carefully preserving the slight bevel (the upper surface

being longer and wider than the ground surface).

Care must be used to leave no sharp edges on the heels that will cut the horse.

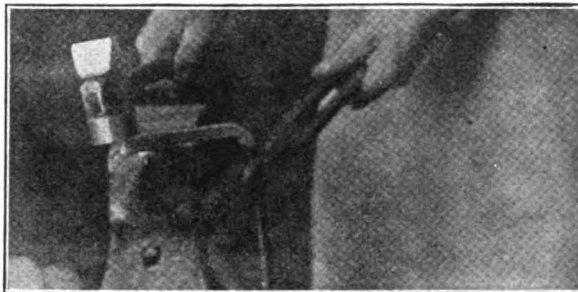


Fig. 4—Shaping one side of bar.



Fig. 5—The steel is shaped by gradually moving it beneath the hammer.

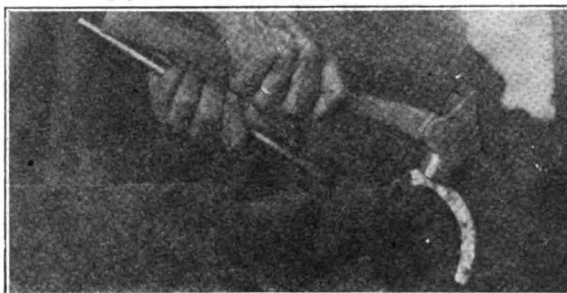


Fig. 6—Rounding out the shoe over the horn of the anvil which is designed to facilitate this.

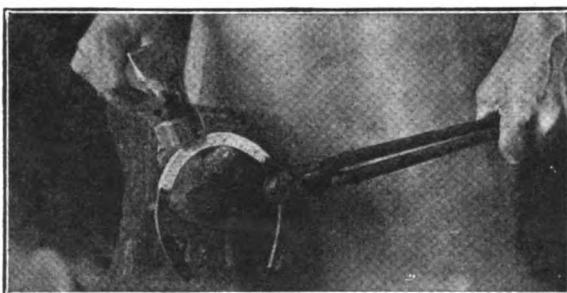


Fig. 7—Centering the toe: Hold the shoe over the point of the horn so that it is correctly centered and strike just beyond the horn.

A pointed heel may cause a "shoe boil" (a bruise at the point of the elbow).

15. To Punch Out the Nail Holes.

Apply the shoe to the model; if

the heels are of proper length and the shoe is an approximate fit, the nail holes are punched out.

The nail holes are started on the ground surface with the countersink because the point of this tool conforms to the shape of the head of the nail. The point should not be driven more than three-fourths through or the shoe will be bulged and ruined. The tool is held slanted outward to conform to the direction which the nail should follow and the hole is started a little outside of the center of the web. (Fig. 14).

Heat one side and first start the hole nearest the toe. Its proper position can be learned by examining a service shoe of the same size. The hole at the bend of the quarter is next started, and finally the hole midway between the two. The plate shoe, on account of its light weight, requires but six nails, three on each side.

Heat the other side and proceed as before.

The nail holes must not be placed too far back. A shoe nailed back of the turn of the quarter will impede the expansion of the hoof and eventually cause contraction of the heels.

If, in punching the nail holes, bulges appear near them on the edges of the bar or shoe, they must be removed by working over the horn. (Same position and means as for drawing heels).

Examine the pritchel, and if it is not of the proper shape, point it before using. (See "Tools," paragraph 1, in last installment).

Punch out the nail holes on the ground surface, holding the pritchel slanted outward (Fig. 15); then punch out the holes on the upper surface, holding the pritchel slanted inward. (Fig. 16).

In pritcheling out a nail hole, to avoid blunting or breaking the point of the pritchel, that part of the shoe where the nail hole is to be, is held over the pritchel or

hardy hole.

16. Fitting.

The shoe is now ready for its final trial and is applied to the model.

If it does not exactly conform to



the model, it will have at least one of the following faults, which must be corrected according to the explanation given in each case.

17. Not Level.

To level the shoe, take it with the

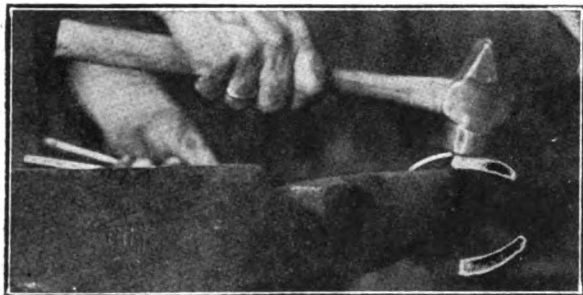


Fig. 8—Drawing out the heels.

tongs near the toe on the far side and examine it by sighting over the upper surface. If it appears to be crooked, lay it on the face of the anvil in a position allowing the highest surface to be struck (see paragraph 9). If, after remedying this defect, a similar one appears, it must be treated in the same manner. A crooked shoe will not stay on the foot and is apt to cause lameness.

When leveling the service shoe, if it be found necessary to strike on the ground surface of the shoe, let the blows fall over the crease in order to avoid spoiling the concave of the upper surface. Special care, however, must be used to strike a square blow. If the face of the hammer does not fall evenly, it will dent and close the crease.

18. Too Wide at the Toe.

Heat the toe and hold it on the extreme point of the horn, the cen-



Fig. 11—To cut off heels, place ground surface on hardy.

ter of the shoe resting on the horn of the anvil. Strike lightly near the toe on the side farthest from you, then reverse the toe and strike as before. (Fig. 17).

19. Too Narrow at the Toe.

Heat the toe and hold it on the horn of the anvil so that there will be a small space between the shoe and the horn. Strike lightly along the toe, not confining the blows to any one spot. (Fig. 18).

20. One Heel and Quarter Too Narrow.

To throw out a heel and quarter from a given point: Heat the quarter and, holding on the spot from which it is desired to spread or



Fig. 9—Drawing out the heels.

throw out the heel and quarter. (Fig. 19).

21. One Heel and Quarter Too Full.

(a) *To throw in a heel and quarter from a given point:* Heat the quarter and hold it over the point of the horn of the anvil so that the shoe will rest upon the inside edge at the point from which the change is to be made. Strike near the heel on the part projecting over the horn. (Fig. 20).

(b) *To throw in one side without changing its general shape:* Heat the whole shoe and place the quarter that is correct in water until cool.

Close the shoe bodily (see paragraph 24), which operation will affect the hot side only.

(c) If neither of these methods accomplishes the desired result the quarter must be reshaped over the diagonal of the horn.

22. A Bulge in the Quarter.

Heat the quarter and hold over the heel of the anvil. Strike directly over the bulge. (Fig. 21).

This will remove the bulge, but will also slightly straighten the quarter, which must later be reshaped.

23. A Short, Straight Place in a Quarter.

Heat the quarter and hold the straight place on the point of the horn, as shown in paragraph 21, but strike alternate blows on each side

of and close to the point to be rounded.

24. Both Quarters Too Full (With the General Shape Correct).

Heat the whole shoe and, holding it on edge on the face of the anvil, strike down on the elevated quarter. This will narrow or close the shoe, but will not change its general shape. (Fig. 22).

25. Both Quarters Too Narrow (With the General Shape Correct).

Heat the whole shoe and, holding one heel on the face of the anvil and one on the side, strike on the toe. This will open or spread the shoe without changing its general shape.

A perfect fit having been obtained the nail holes are re-punched if necessary, and the whole shoe neatly finished with the rasp.

(To be Continued.)

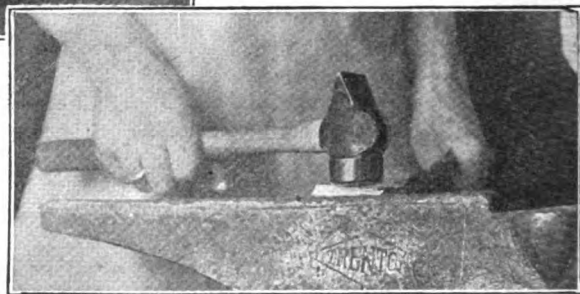


Fig. 10—After drawing out, to restore heels to original thickness, work on face of anvil.

The Motor Car Paint Shop —III.*

A Series of Helpful Articles on Painting and Re-painting the Automobile

Before taking up in detail the various painting systems, a few pre-

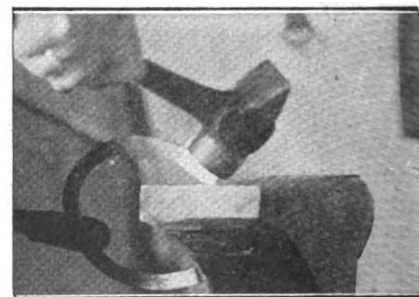


Fig. 12—Bringing heel back to original width after cutting.

liminary remarks regarding the care of painting materials and brushes and the general condition of the paint-shop are advisable.

When a can of material is opened



it should be immediately closed and tightly corked as soon as any material is removed from the can, as nearly all materials deteriorate when they come in contact with the air.

All materials containing pigment have a tendency to settle in the can. In some grades of paint and color varnishes this tendency is greater than in others, but it is never entire-

ly absent. In good shops it is often the rule to go over the stock of pigment materials every so often and turn the cans upside down or reverse them to their proper position, as the case may be. If this rule is followed, it will almost eliminate trouble from the settlement of pigments. It is well, however, as a precautionary measure to shake well any material containing pigment before using.

Your old-fashioned painter, brought up perhaps on the apprentice system and thoroughly grounded in the principles of right practice, is as careful of his paint-brushes as he is of his gold watch. He will not allow any other painter to touch his brushes. He keeps them perfectly clean and always places them immediately in the brush-keeper as soon as he is finished with a job. A first-class brush kept in this way will last for many years — sometimes twenty or more — and be as good at the end of that period as at the beginning. In fact, a good painter prefers an old brush to a new one.

The importance of thoroughly cleaning every job before applying any paint coat cannot be insisted on too strongly. The mud coat to which the old carriage was subjected is hardly worth mentioning in comparison with the combination of grease, mud and road-oil which accumulates on the motor-car if the owner is not especially careful in looking after his machine, and even the neatest of owners allows the chassis to become caked with it.

Another foe to the finish of the car is the recently introduced "polish," under its various disguises. Most polishes injure the old

finish itself and should be strictly let alone by the owner. But their effect on the old finish is not their worst evil. Chiefly, the good painter detests them because it is pretty nearly impossible to remove them thoroughly when he gets ready to give the car a new finish. If any slight trace of wax, one of the ingredients of most of these "polishes," remains in the cracks

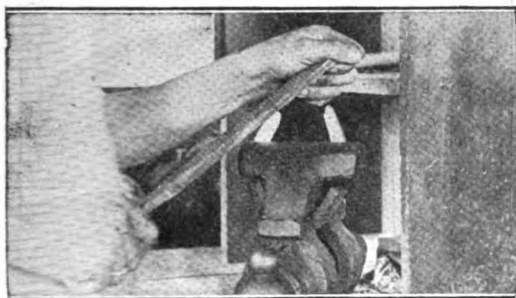


Fig. 13—Hot rasping the shoe.



Fig. 14—Punching out nail holes.

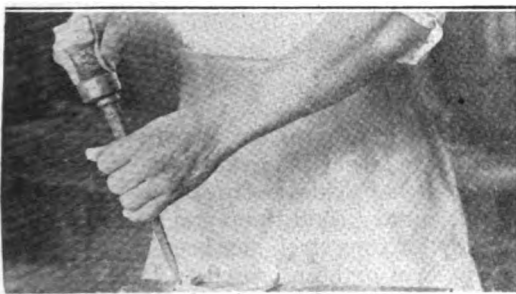


Fig. 15—In punching out nail holes on ground surface, hold pritchel slanting outward

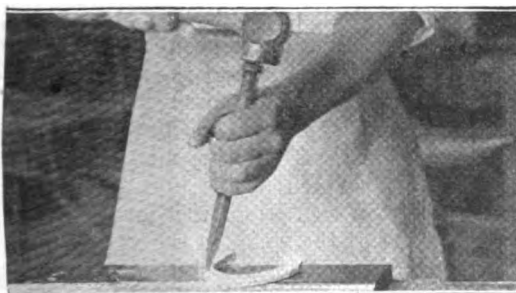


Fig. 16—In punching out nail holes on upper surface, slant pritchel inward.

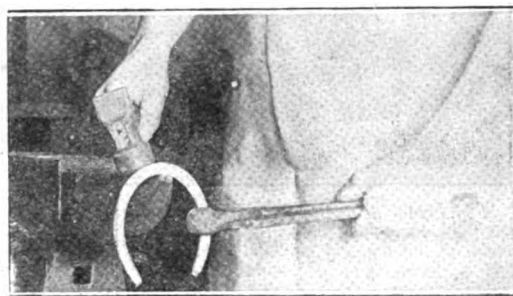


Fig. 17—Shaping the shoe when too wide at toe.



Fig. 18—Shaping the shoe when too narrow at toe.

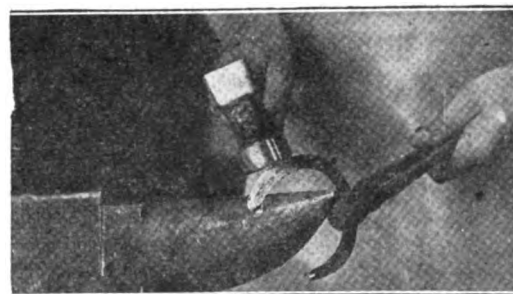


Fig. 19—Shaping the shoe when one heel and a quarter are too narrow.

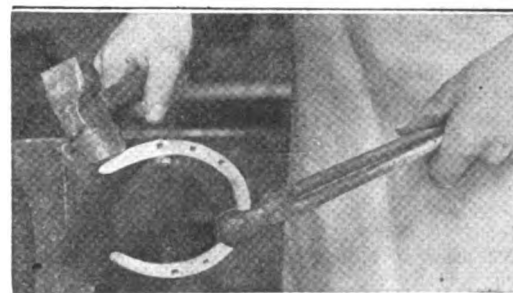


Fig. 20—Shaping the shoe when one heel and quarter are too full.

*Courtesy Valentine & Co.



of the old coats, or on the surface, it is certain to be a menace to the new job.

More painting jobs have gone wrong in the past few years particularly because of this evil than from any other cause. Even the best of painters get caught napping

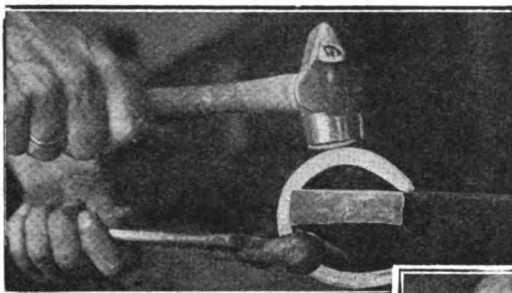


Fig. 21—Shaping the shoe where there is a bulge in quarter.

occasionally when the painter has not been thorough enough in his work, because on the surface the job seems to be thoroughly clean, while in the deeper cracks there may lurk a little wax that will greatly retard if not prevent the drying of the paint coat or varnish.

Wash the car thoroughly first with gasoline and then with clean water, and be certain that the surfaces to be painted or varnished are thoroughly dry before applying any coat of material.

In conclusion, it is well to refer again in this place to the other chief foes of good work: dust, draughts, coal-gas, lack of oxygen and insufficient heat.

At the risk of becoming tiresome it must be insisted that success in painting and finishing work depends absolutely on the avoidance of these evils.

When a job goes wrong, nine times out of ten it will be found to be due to one of these causes:

Wax.

Dust.

Lack of Oxygen.

Coal-gas.

Insufficient heat.

Insufficient drying of surface or of undercoat.

(To be Continued.)

Saving at Home

Unless your own family is a member of the U. S. Food Administration, you cannot properly influence others. If you have not already signed the Food Pledge, you should do so at once through the Federal Food Administrator of your state.

The Oxy-Acetylene Plant—9

Its Installation, Operation and Torch Manipulation

DAVID BAXTER
Reheating

After the weld is finished and be-

fore we proceed to cool it, or to allow it to cool, it is sometimes advisable, and even necessary to reheat, either in portion or entirely, the casting welded. Reheating in this case is usually to bring up the expan-

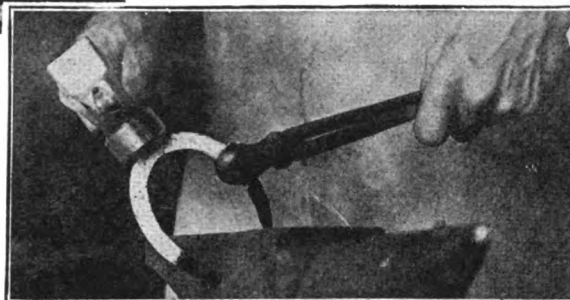


Fig. 23—Shaping the shoe when both quarters are too narrow.

sion, which has been allowed to reduce during the welding operation; or to prevent the contraction from setting in too soon. It is sometimes done to even up the contraction, by getting the thinner and lighter sections as hot as the heavier sections. The lighter parts cool much faster in the open than do the heavier parts, therefore it is safer to reheat them to the temperature of the heavy parts before banking or covering up the casting. This unequal cooling takes place while the welding is under way when it is inconvenient to preheat or enliven the preheating fire.

Another reason for reheating is for annealing purposes. Castings are usually annealed to soften them, but unless it is done by some one experienced in such work, it is of little use to anneal for this purpose. The casting requires a certain degree and amount of heat for quite a long number of hours. A greater length of time and better equipment is required than most of the welding plants can afford so we will not attempt to go into the subject.

Some welded jobs must be tempered or the temper must be restored. This fact is mentioned here just to show it is sometimes necessary. This concerns for the most part springs,

blades and other pliable articles.

Another object of preheating is what is called restoration of steel. As this subject is more or less technical, we will only attempt to give the operator a general knowledge of the workings of it together with hints by which he may work out the

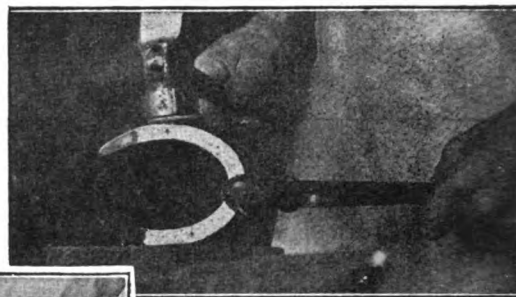


Fig. 22—Shaping the shoe when both quarters are too narrow.

problem in his own way.

The inexperienced torch-operator may weld a steel job in an apparently satisfactory manner only to find it lacks strength and breaks again. Take for instance a shafting which he may flow together in a truly scientific way only

to have it break again when put in duty. This is more often due to the kind of steel, which changes its structure with certain heat treatment. The operator, to learn the welding of steel, should know that it needs what is termed restoration, or restoring the structure to the original condition before the heat of the welding changed it.

The smaller the grains of the structure, the stronger the steel; and the larger the grains, the weaker the steel. This is true speaking of ordinary conditions and usages.

After steel has been exposed to heat or been heated to 1,425 degrees or over, the grains become large in proportion to the degrees above 1,425, up to the melting point. Now when we weld a piece of steel we heat it to the melting point—the filler also is melted. This means that the grains have been enlarged to their maximum and the strength reduced to the minimum. The adjoining parts have had different grades of heat from the melting point down; which means that the grains vary in size from very large, in the heart of the weld, to the very small; or to their normal state, in the cold part of the metal. This in turn means different grades of strength.



We can not prevent this change of structure, so long as the metal has to be heated to the melting point before it will weld. But the steel may be restored — meaning that the grains may be returned to their normal size; and if the steel has not been burned it will respond to proper treatment.

To properly restore steel that has been welded, it should first be cooled to a temperature below 1,200 degrees, far enough below to be certain that the inside as well as the outside is below 1,200. It is not required to be cold or any ways near cold. But be sure it is below 1,200. To the layman this is still very hot. The 1,200 degrees applies to all steel whether it is of the highest or the lowest carbon content.

After we have cooled the weld as stated, we again raise the temperature, slowly, in order to stop at just the right time. The proper temperature to reach in the reheating process is determined by the carbon content of the steel. But in any event, the steel must be reheated to above 1,275 degrees. How far above is determined by the carbon. To the average operator heat measuring devices are practically prohibited, so he must judge by his eye, after the heat has passed a certain mark.

A simple device which will help him to determine when near the 1,275 degrees is the common Horse-shoe-magnet, which is a fairly accurate guide. Steel loses its magnetic quality at or very near the 1,275 mark. The magnet will then cease to have any attraction for the steel. As steel is to be cooled below 1,200, at which temperature the magnet acts, and heated above 1,275 at which temperature the magnet ceases to act, we have a simple instrument, which, if combined with good judgment will prove sufficient.

To determine where to stop reheating is a more delicate matter, but it may be done accurately enough for everyday work with some practice. As certain kinds of steel are usually used for certain things of similar nature, the operator can judge pretty close to the carbon content, if he knows what the piece was used for.

In reheating carbon tool-steel, heat it a little above 1,275 degrees, say 25 to 40 degrees. This is a range that allows room for almost anyone.

For reheating steel with a carbon content of 0.50 to 0.90 per cent., the heat is raised to 1,400 degrees for the 0.50, and for every 0.10 per

cent. above 0.50 we subtract 3.15 degrees from the 1,400. It is better to slightly exceed the degrees given here. In simpler words: for both carbon tool-steel and medium (0.50 to 0.90 per cent.) carbon steel, reheat above the temperature at which they cease to be attracted by a magnet.

The less carbon, the higher the temperature should be raised. For steel having less than 0.50 per cent. the temperature is raised according only 0.10 per cent. of carbon reheat to the carbon, thus: if the steel has to a little more than 1,600 degrees. For every 0.01 per cent. in excess of 0.10 per cent. we subtract 5 degrees from the 1,600.

The horse-shoe magnet is not adequate for low carbon steel, so we must depend upon judgment, in absence of heat-measuring devices. An element to consider is the fact that it is almost impossible to make perfectly uniform steels. This fact leads to the reason why we should reheat a few degrees above calculation.

A good way to learn the degrees of heat is to heat a bar of steel with varying degrees of heat from one end to the other, watching the color and fixing the picture in the mind. Then break the bar up at various points and examine the grain. This will give the idea of the size of grain according to the heat. If the operator has a picture in his mind he can know the heat required to the grain size.

One method of reheating is to use a forge or reheating furnace; slowly testing from time to time with a magnet. Heat all sides of the weld if possible as it is essential that the centre of the weld be as hot as the outside.

Another method and an excellent one, is to prepare a bath of melted metal, lead or some other metal of known melting point (the melting point gives a basis to figure from). Into this bath place the part welded, keeping it there until the bath has raised its temperature to that of the bath. Be sure the heat is the same to the centre. The final cooling of restored steel is done in the best way, in most cases, by cooling very slowly. Cover the parts with ashes, asbestos-scrap or other non-conductor, and allow it to cool as it will. Sometimes it takes hours, depending on the size and weight of the casting. Rapid cooling causes an unequal contraction to set in, the heavier parts cooling slower than the lighter. (To be Continued)



Queries— Answers— Notes

A Letter from France—I have no doubt you will be surprised to hear from me, as it is some time now since I last penned a letter to you. This war has brought a great many changes and seems to have turned some things upside down. The old Journal is still going well. I get my copy every month and if all's well, they will return home with me. I am getting on fairly well, considering there's a war on, I think the change of work has done me good, and has given me a new lease of life.

SEBET. T. NORTHWOOD,
26th Motor Ambulance convoy, British Expeditionary Force, France.

Another Reader in the Army—I have been in Uncle Sam's service since July so haven't seen much of Our Journal. I always like to read it, but we are moving so much I think I will have to wait until we are home again. I am shoeing mules at the present time.

L. D. WYALLUP, Washington.

Prices in Scotland—Material has gone up in price in this country very much for the last three years and we had to raise our prices, but I am afraid we did not raise them enough. I pay about £30 (\$146.00) per ton on H. S. iron and £3 (\$14.61) per ton for coal, 4/ (.97)—per set of shoes before the war. Our charge now is 6/ (1.47)—. It's all light horses we have here—my heaviest iron for shoes is 1 1/8 x 1/2 and 1 x 1/2, 7/8 x 1/2; no toes on shoes—just the two heels. I used to go in for machine-made shoes but I cannot get them now.

THOS. MACNEILL, Scotland.

An Appreciation of Will Bishop's Articles—I have been reading the journal for almost two years, and have got a great deal of good out of it. I was glad when Will Bishop started to writing about the Power Hammer, for I am one that loves the hammer and have tried to get men that I have worked for to use the hammer more than they do. I can do more work under the hammer than two men can do by hand. And, as I am writing, I want to say something about the working man. Do you think they are being treated right by not being paid living wages? I have been working at the business 17 years, and can't get any more now than I got 10 years ago. I got \$3.50 a day then and now I am working for the same and less.

G. E. TRYON, Kansas.

From a Real "Old-Timer"—As to how I like "Our Journal," I will say that I like it extremely well; but, as a doctor once

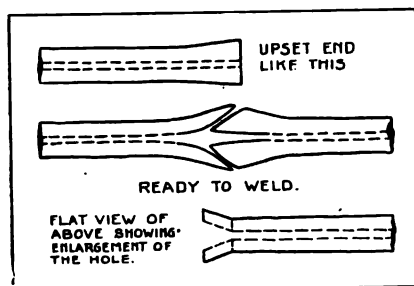


told my wife as to what was the matter with her eyes, he said she was born a little too early in the last century! So it is with me. I am too old to make use of the many good suggestions that are given in our journal. I was born December, 1844, spent 4 years and two months in the Army and Navy, serving about six months on one of our blockaders around the mouth of the Mississippi River and coast of Florida during the Civil War and that was before I was of age. Been blacksmithing since 1876 in one shop. Among the articles in the September number I liked, were "The Cruise of an Anvil Pounder," and "Building a Successful Business from a Small Shop," I will just say that they are all good. I wish you well. All young smiths ought to take your journal.

E. SAUDERS, Ohio.

Welding Broken Drills for Coal Mining—

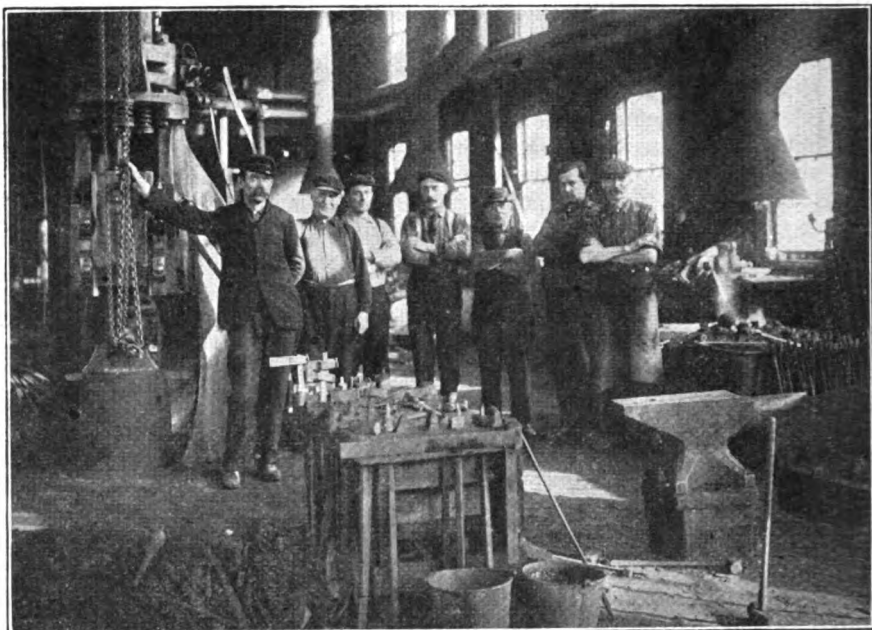
I was doing some work for a coal company and, at the time, the drillers broke two of the 4-foot air drills near the center of the drills and either of the pieces were too short to drill with. To order some new drills would have caused several days' delay and would have caused a lay-off of the men and consequent delay in filling orders for coal. The pieces were sent to me to see if they could not be fixed so the men could work right along without being laid off. I looked at them and studied awhile and then went to work to do what I could. I upset each end and drew end out to a thin edge like a cold chisel—but not quite as long, trimmed out the inside edges and opened up the hole with a punch a little larger than the original hole. Then I upset the other end and split it and sharpened each end and opened the hole a little larger than the original size of the hole. Then I put them together and put them in the fire, put on some borax and drove the ends together while in the fire with a welding heat on, took it out on the anvil and welded up with a light hand hammer, being careful not to hammer it too much to close up the hole in the center as this had to be left open for the air to pass through. I left them a little bigger in the welded place so as to make them



DETAILS OF MR. BOETTLE'S METHOD OF WELDING BROKEN DRILLS USED IN COAL MINING

strong enough to stand the pressure of the jar of the jack hammer. There was still an opening through the drill stem when I got them welded so the air could pass through as good as before and the drillers worked on without laying off or losing any time. They were kept busy at some other work while I was fixing the drills. This happened a little over a year ago and the welds were good yet the last time I noticed them.

W. D. BOETTLE, Missouri.



THE BLACKSMITH SHOP OF THE HERRESHOFF MFG. CO., WHICH SPECIALIZES IN THE MAKING OF ANCHORS AND HEAVY FITTINGS FOR RACING YACHTS. NOTE THE UP-TO-DATE EQUIPMENT, THE EXCELLENT LIGHTING AND THE GENERAL ORDER AND SYSTEM. CONTRIBUTED BY MR. N. G. HERRESHOFF, JR., RHODE ISLAND

Curing Contracted Feet — Reading Brother T. W. Harlow's views on shoeing contracted hoof, after 34 years of horse shoeing and after curing contracted hoofs, I will relate my own observation.

With many a horse, and in fact with most all, contraction is caused from cutting out the bar of the hoof and then putting on a wide shoe (that is, a shoe wider than the hoof) and then letting the shoe stay on too long. If you will notice closely, with a shoe that has been on too long the hoof will be found projecting over the shoe. Such is only too frequent for the horse's comfort. Take a look at the shoe where it touches the hoof and you will find it worn bright on the side next to the hoof. In fact, I have seen them worn down 1/16 in some cases. That is gross negligence on the owner's part, and any man using a horse in that condition shouldn't be allowed to have a horse.

Many times it causes the hoof to crack and break away from the bar of the hoof, then trouble comes in for all the horse, the owner and the shoer as well. This will happen in any dry climate. My success has been to pare the hoof as usual and cut away all the dead substance of the hoof. Make the shoe fit the very edge of the hoof all the way round, and at the heels make the shoe fit a little inside the hoof bevel and the outside of the shoe all the way from the last nail. Here let me say I always use the Capewell horse nail, because they are made the proper thickness, and never spread the hoof substance, thereby making the shoe hold longer. Always remember you can tack a shingle onto a board, but you can't tack a board onto a shingle.

In preparing the shoe with the outside hammered down to about 1/8 and the inside 3/8 and you have a 1/4 bevel, and every time the horse steps he presses down and as the hoof grows it spreads the hoof. Care should be used not to shoe the horse this way in the *summer* time; it will spread

the hoof and make it sore. It is the natural way for a horse's hoof to go, and it was so constructed in the beginning. Trim one of those long hoofs down and save the paring and let it stay in the sun two days and the ends at the bar of the hoof will touch each other, or come together.

Shoe the horse in the wettest, muddiest time on the calendar. A hoof will be soft



MR. OTT'S SHOE FOR CONTRACTED HOOF

and grow faster, and in two winters you can cure the worst kind of contraction.

W. J. OTT, California.

Business and Prices in South Dakota— It has been over a year since I have written to you, and think it about time to do so again for I have been reading other smiths' letters and it may be they would read one from me.

Business has been excellent this year and also collections, for we have one of the largest crop yields we were ever known to have, and everybody around here feels prosperous. Talking about hired help will say it is hard to get and will tell you how I got mine: I don't pay them just fair, but give them good living wages so they can have a little left out of their checks. They always make the best of help and the cheapest in the long run. I am sending you a picture of our new shop, which was built about a year ago on the same ground as the old one stood. It is 30 x 50 with 9 ft. sides. We have an



L built on one side, 8 x 16, for iron rack; also most every kind of machinery that it takes to make a up-to-date general blacksmith shop—one 5 H. P. Electric Motor, one ½ H. P. 2-Electric fires, Oxy-Acetylene Welding Machine, etc. Our prices are good for we have made them so. I think they are up to the average smith prices:

8 new shoes up to No. 6—per team	\$ 5.00
8 new shoes above No. 6, per team	6.00
Resetting old shoes—each	.35
N. S. shoes, new—per team	6.00
N. S. calks, each	.07½
Stallion shoes, new, each	1.25
Stallion shoes, old, each	1.00
Set tire hot, narrow, 75 wide, each	1.00
Set tire cold, narrow, 50 wide, ½ rim, each	1.25
Spokes, each	.35
Wagon axle, front or hind	5.00
Wagon pole (use old iron and hounds)	4.00
Wagon hounds, each	1.50
Wagon cut down	15.00
Wagon pole caps, each (Buggy work the same.)	.75
Buggy axle, each	1.50
Buggy brace, welded	.50
Buggy reach each	1.28
Buggy shaft, each	1.50
Buggy cross bar, each	1.50
Pt. stubble plow lay	1.25
Pt. braker plow lay	1.00
Sharp stubble plow lay	.75
Sharp braker plow lay	.50
Sharp cultivator shovels, per set	1.25
Sharp Disc, per blade	.25
Sharp Lister	1.00
Pt. Lister	1.50
Weld Mower Sickel	.75
Weld header	1.50
Guard poles set on each 6	.10
Taking off and put on guards per ft.	.10

We have three shops in our town and our competitors are both good fellows and good mechanics and we get along fine. We have had a large business this year so far and prospects of a good shoeing winter—Not wishing the farmers any ill will, but send forth the rain and ice!

"A POOL THAT SPARKS" SHOP, S. Dakota.



AN UP-TO-DATE SOUTH DAKOTA SHOP. NOTE THE UNIQUE SIGN

Tempering Mill Picks—I have been taking your paper for a long time and have gotten some very good ideas from it. I am sending you a recipe for tempering

mill picks that I have used with very satisfactory results. I dress all the mill picks in my region and am, in fact, the only man around here who can temper them successfully. I got it from a tramp millwright and would not have believed that a pick would stand what I have seen them stand if I had not already seen it used and I have been blacksmithing since 1876. I am confident that anyone who gets the recipe filled according to the formula and temper according to my directions that they will be satisfied with results. If any of them should want further information as to how to use it, I will gladly give it. The following is the recipe:

Nitrate of Potash	1 oz.
Bi-carbonate of Potash	1 oz.
Sulphate of Zinc	1 oz.
Carbonate of Soda	½ oz.
Carbonate of iron	1 dram

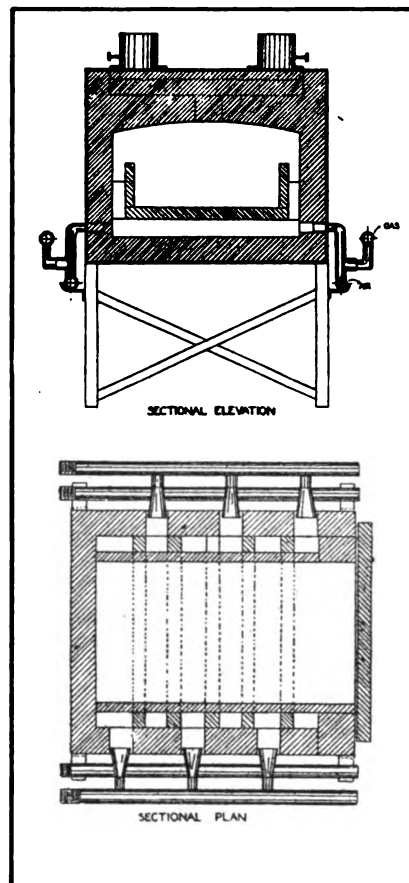
Mix thoroughly. Dress pick carefully, not heating too high, heat to a dark cherry red and put on each side of pick as far up as you wish to temper, say 1½ in. Put back into the fire (always on top of fire). Heat to a dark cherry red and cool off quickly by shaking pick in the water. Of course, the hotter you make the pick the harder it will be. If the pick looks bright like silver, it is very likely to stand; if it should scale, do not heat so high so it looks somewhat clouded after being tempered. If this recipe is properly filled, when put on the pick it will flow like water. Put first on one side and then turn over and put on the other. If any other readers should try the above recipe I would be glad to hear from them. I have been blacksmithing since 1876 and want to give this to others as I am about through. I hope it may do some blacksmith some good as I know it will, I close.

E. S. SANDERS, Ohio.

Gas-Furnace for Case Hardening—Specifications: furnace, semi-muffle; working space, 36 ins. deep by 24 ins. wide by 12 ins. high; case, ¼-in. mild steel-plate; lining, lined with 4½ ins. of best firebrick; frame, of 2 ins. by ½ in. angle iron with suitable tie-bars; floor, built of 9 ins. by

hausting the products of combustion into a box-flue having 2 to 6-in. flue-nozzles, with suitable dampers fitted at each end of furnace.

—W. H. MASON,
British Gas Commercial Association, from the "English Mechanic."



DETAILS OF CONSTRUCTION FOR BUILDING A CASE-HARDENING GAS FURNACE. SEE MR. MASON'S ARTICLE

Has Faith in the Older Men—I read with much interest in your last month's journal, the article of Mr. Bishop and believe with him that the Power Hammer should be made to earn its board, but do not think it best to make a tool for a certain piece of forging unless there are enough in quantity to pay for the tool. One could make one forging of either of his samples as quickly as the tool to make it in. I have a number of tools I use where the number is large enough to pay for tools and find it pays to use them.

I also read the article on "When is a Man Too Old For Work?" I know some men not yet out of their teens who are older in their actions than some I know who are past seventy. I have in mind a man who worked with me. He was about 68 and a good every-day man. The foreman came in one afternoon at four o'clock and laid him off. He had been on the job for twenty years; he felt rather bad but had to take it. This was ten years ago. There have been 14 different men on the job since and he was worth any two of them. He found another place and is still working every day, so it goes to show that he was not quite all-in. I am sending you a clipping I found in our local paper bearing on the same subject.

H. N. POPE, Connecticut.

Welding Broken Auto Springs—Hello Boys. It has been some nine years since I called on you through Our Journal, and probably would have been some time longer, but I see in the August number. Wm. Fix, of Illinois, inquires in regard to welding spring steel, also in this same issue Wm. Olsen, of South Dakota, inquires in regard to welding a plow lay. I cannot agree with either answer. You say, split the spring and then scarf and tie them together, put them in fire and bring them to welding heat and so on.

Now if we are going to tie them together why not just punch two holes in them, get a piece of wire and do it right in regular farmer style? To split these two halves, if you have a helper, it can be done in one heat at about 1½ minutes' time for smith and helper or 3 minutes' time with no helper and it is to be done with chisel and hand hammer. I would advise Mr. Fix to get an old spring, break it in two, scarf it just as you would any old piece of iron. Never mind about up-

and lay them together just as you would any piece of iron, and grab the hammer and go to it. If you see sparks going up out of your fire that is melted steel, just throw that piece away for they are burned and no good.

Some Arkansas Prices—The smiths in this country are working at the same old prices they did 10 years ago, and I cannot get them to change—fools they are indeed.

Shoeing horses for \$1.10 up to No. 3—

J. L. STROYICK, LOWELL, ARIZONA OLD MASON BLACKSMITH SHOP

General blacksmithing and horseshoeing; welding, auto springs a specialty; storage room for autos by the month. I also handle the famous Norwalk casings and tubes, 6000 to 7000 miles guarantee. I also have two second hand cars for sale.

A LIVE ARIZONA BLACKSMITH REACHES OUT FOR MORE BUSINESS BY RUNNING THIS AD IN A "LOCAL"

Just keep at it till you learn what a welding heat looks like and then you will wonder how you ever fell down on spring welding, for it is just as easy to weld as iron if the heat is right. I always talked every customer of mine into putting in a new spring if possible until the autos came, and I saw if I could weld a spring and warrant it as good as before it was broken I sure would be able to get some easy money and at the same time save my customer money. So I began to study the proposition and I am going to give Wm. Fix what knowledge I have received by experiment (you other fellows don't listen). Now Wm., we know when we heat a piece of steel it expands or in other words the molecules of steel enlarge. We also have found out that the process of hammering the weld while the steel is hot settles these grains of steel together. So our spring is stronger where we have handled it than it is on either side of the weld where it has been hot and let cool off. Now Wm., this being finished, then the problem is to strengthen these weak places, so we just pick up our spring steel, put it in the fire and when hot enough work easy. We scarf it short and sharp so the point of scarf will not cut in and leave a lump. If this spring which we are welding is ¼ x 1 in. or larger we grab our 5-pound hammer with 2 in. face and just a little crown on face and 18 in. handle. When our spring gets to a welding heat we take the ends out, place one on top of the other so as to just nicely fit and come as near as we can to making the weld at the first stroke of the hammer. Three strokes are plenty if properly applied. Now put her back in the fire and if there is to be a hole in it just get a punch with a true face and so it will cut a clean hole and punch the hole. Then, with the spring nicely red, get your 5-pound hammer and commence to hand the spring back one inch from where it is red clear across the red to one inch on the other side and be sure that you have pounded it as hard where you did not weld it as where you did weld it, and don't leave any humps or lumps on it. Better be thinner and be even than any thicker than the rest of the spring. When it doesn't show red any longer cover with coked coal till cold. I have been welding springs for autos this way for 18 months and I make new springs and offer to weld any spring and if it doesn't give satisfaction, to furnish a new leaf in the place of the one I welded and deduct the price of welding from the new leaf. I have out some 40 springs on these terms and have not had to replace any with new ones.

E. E. MERCER, Kansas.

gives us 70c for labor. Making wagon tires for \$2.00 per set, 1½ x ½ or ¾ x 1½; other work in accordance with prices like these. So you will please give us a *welding hot* article in your paper, and I will buy enough copies to send one to each and all of those fellows who are such back numbers!

M. B. NICHOLS, Arkansas.

A Bevy of Excellent Auto Repair Kinks—Some of the craft may have leaking radiators to repair and if the leaks are such as can be reached, soldering is the proper remedy; and if it is on the inside just take a ladle and put sulphur in it and melt it over a forge fire. When in a liquid state, stir it and pour into the leaks. It will cool and hardening at once will effectively seal up the leaks. A better plan—if it is not a rush job—is to use a glycerine and litharge as follows: Mix up a small amount at a time into a paste that will not be too thick to run. Pour it into the leak and let it set for several hours, then test out and repeat if all leaks are not stopped.

If these ingredients cannot be had, a cement made of Portland cement, sand and water will answer, or take wood-ashes, salt and water, which will do very nicely.

When putting in a Ford front spring, it usually happens that the centre bolt is not in the centre of the frame. To remove it to the centre take a jack and place it between the frame and the axle just inside the front wheel and the frame may be pushed easily to the centre of the spring.

In oxy-acetylene welding of castings I often place the parts together cold and weld in one or two places sufficiently to hold in place and then put the parts in the forge and heat to a red heat and finish up. This helps to save gas and does a better job. My trouble in this kind of work is with pin-holes or porous welds and I have not yet been able to overcome this trouble.

If the rims on car wheels are loose, just take them off and lay a strip of tin around the felloes, and tack in place. Then heat the rim, put it on and shrink it tight by cooling in water and you have it as tight as ever.

Will close by saying if there is a long split in an inner tube to vulcanize, a good reinforcement for the inside can be made by taking an old inner tube and cutting a strip of suitable length and cleaning one side. In the meantime coat inside of rent with cement. Place the reinforcement on inside and finish outside as usual.

F. G. HOSKINS, Texas.

The Old Man Comes Back

One year ago an old man was working on the streets of Bridgeport at \$2 per day. He was an expert pattern maker and something of an inventor on the side. There was but one thing against him, he was ancient and slow. There was no place for him save on the streets of the city.

Today he is making patterns for a concern in this city and earning \$4.50 per day. And he is worth every cent they pay him, for he is a thorough workman, intelligent and competent for every task. He is a sharp contrast to the boys that formerly held down the job. But he is turning out more work than they could turn out, for his task is well done and there are no return jobs. This could not be said of all the youths who held down such responsible jobs.

This is a typical case. The old man is coming once more into his own. It has long seemed to be a denial of all our principles of efficiency to turn off the man who through many years had learned to do a thing well, and hire a man who could produce only quantity.

The hour demands quality as well as quantity, and the old man, the seasoned man, is the man to put quality in his work.

The opportunity is here now for many a man with gray in his hair to prove not only that he is a good workman in time of war when the youth is with the colors, but that he is a good workman at all times.

—From the "Bridgeport Telegram"

THE CLIPPING REFERRED TO BY MR. POPE

setting it, be sure the scarfs are drawn short. Lam the two pieces into your fire and far enough in to get them hot 3 inches from end, and when good and red put on plenty of borax and draw them out of the fire so the ends are about the middle of the fire. Now we will put pulverized borax on the spring till the springs look greasy two inches from the ends. This borax is to prevent the steel from burning before it gets to a welding heat. When you think they are hot enough to weld by the looks of them, take out



The Automobile Repairman

Painting the Automobile—2

From the Viewpoint of a Practical Vehicle Painter

M. C. HILICK.

Cleaning and Conditioning the Surface

Regardless of the class of painting repairs applied to the car, the first process of work, after shopping the vehicle, consists in cleaning it. The washing of the car during its life of service, while good as far as it goes, does not, as a rule, serve to keep the surface clean of all the road accumulations. These consist largely of tar and grease with considerable dust cemented to these substances, and as a result, when the vehicle is shopped for painting or varnishing repairs, there is usually more or less of these sticky, adhesive substances, plastered to the surface and hard enough to be fairly a part of it. Therefore, after the water wash, the next step is to take the grease and tar-smears off.

These substances may be dissolved by applying raw linseed oil freely and letting this stand for a day or a night. They will commonly soften up sufficiently to permit removal with waste or cloth saturated with turpentine. Gasoline may be used in place of the turpentine if the insurance regulations do not forbid, although the turpentine is the more active medium. If, after the turpentine treatment, the surface still remains unfit to proceed with the painting operations, it had best be rubbed carefully with water and pumice stone flour. This method will completely remove all greasy

smears and foreign matter and finely condition the surface for painting and varnishing; when the car is to be touched up with color, and varnished, the water and pumice stone flour rubbing is essential in all circumstances. When it is to be coated up with surfacing materials, rubbed, and then colored and finished in the usual way, the rubbing may often be omitted, provided the surface is clean enough to take the paint or color and give the pigment a good hold or chance to stick. When the latter practice is to be carried out, the rubbing is omitted, it is always desirable to sandpaper the surface with No. 1/2 or No. 00 paper to roughen up the surface and give the paint or surfacing coats a secure foothold. The sandpapering work may rightly be esteemed a necessary operation on all but those surfaces which are to be simply touched up and varnished; these, as above stated, will need rubbing with water and pumice stone flour, or as it is sometimes otherwise termed, pulverized pumice stone. In the event of putting the body surface of the car through a thorough course of building up with roughstuff and rubbing down, the sandpaper used in wearing the film of old varnish or paint down and roughening up the work for the reception of the new material, may well be No. 1 or 1 1/2. This may seem a little coarse at the start, but it will serve to tear up the old adamant pigment and open up the old hard surface and give the new pigment a better foundation and a more secure footing. These are things which the painter in the small shop, no less than in the big one, will find needful to observe in the painting of automobiles. A clean surface to start with is necessary—the very first necessity, it may be said. Then always the fitting of the surface to receive the coats of pigment. The farmer would scarcely think of sowing a piece of land with wheat or some other grain without harrowing the soil and otherwise conditioning it for the reception of the seed. The same need is present when the painting of the car is to be taken along in the proper way. Indeed, some of the best car painters say that the making ready of the surface for the painting is really the most important part of the painting and varnishing work. They set great store by this cleaning and conditioning process; so much so, in fact, that the city painter makes a special charge, as a rule, of from five to

eight dollars, for cleaning and making the car ready for the painter. It is not alone the body of the car that justifies the price for the work, for the running parts are included in the above, and anyone who has ever had a job of this kind to do in a manner fine and clean enough to satisfy the critical painter will freely admit that it is worth the price.

The chassis will be found oftener than not in a much dirtier and pastier condition than the body of the car. As in the case of the body, saturate the parts freely with the oil, and at the end of ten or twelve hours apply turpentine. The scraper will also often be needed to get off some of the hard accumulations. An old mowing machine knife will prove an effective tool to scrape and cut off the foreign substances. A common case knife will also serve a good turn in this work. Strips of burlap, say, three or four inches wide, are handy and cheap fabrics with which to wipe the surface after saturating with the oil and turpentine, etc. Perhaps there may be found parts of the lower mechanism which will need, in making clean, some strong detergent like a solution of lye and soap and water, or a sal-soda solution, or caustic soda. These are all powerful alkaline mediums and the latter, at any rate, will prove equal, generally speaking, to taking off the worst specimens of tar and road grease accumulations. It should be applied with a swab made of burlaps or hemp, and then washed thoroughly from the surface with clean water.

After the washing and cleaning and conditioning of the surface, it should be carefully inspected and all places found chipped off or bare of paint touched up with a pigment containing enough raw linseed oil to fasten the material to the surface. This will insure having all parts of the surface coated up and on an equality. If the car is made of metal throughout, body panels, etc., the defects and chipped places should be scraped down to the bright metal and then hand emiered with emery cloth or paper. Then apply a drop or two of metal primer, or oxide paint, or red lead paint, carrying in both cases, quite one-half raw linseed oil to an equal quantity of turpentine. Confine this mixture precisely to the defect, and allow to dry thoroughly before coating again. If the defect goes deeper than the old paint film it should be stopped full with hard drying putty; in fact, if the old paint has flaked off even to



the depth of a coat or two of paint, it should be brought up level with the old surface with the hard drying putty. This putty is usually, and economically, made in the shop. The formula is as follows: Equal parts of rubbing varnish and pale drying japan, into which is worked one-third best whiting and two-thirds of dry white lead. The whiting should be the kind known as second layer whiting—that is the second layer in the settling tank. If desired, as a means of making the putty come at less cost, without subtracting from its value, the whiting may be used in two parts to three parts of lead. In the making of the putty plan to work and knead the putty very thoroughly, so that no fine or small particles of dry pigment may be found in the completed article. These dry particles break out when the putty is being sandpapered making minute holes which must later be filled with a new coating of the putty. Thus extra work is avoided. With the surface cleaned and conditioned and touched up and puttied one start is made. If the surface is to be coated up with roughstuff these putty spots will not need sandpapering down; just coat right over them with the coarse surfacing coats, applying anywhere from three to four coats of roughstuff.

In the use of roughstuff there are two choices available, viz: shop-made from the raw material, and the bought, ready-to-use kind. The latter comes in a semi-paste form and requires merely a thinning to the right brushing consistency with turpentine. To make the roughstuff in the shop it will be necessary to buy the dry filler of which there are several makes and all good.

To make the roughstuff take equal parts of filler and keg white lead, by weight, and in equal parts of rubbing varnish and coach japan, stir the lead and filler to a heavy paste; then with turpentine thin to the brushing consistency desired. In the application of roughstuff it is necessary that the stuff coats go to the surface a little heavier in body than ordinary paint coats. Two coats of the roughstuff made in the shop may be applied per day, applying first coat early in the day and the second one at the closing hour. Roughstuff is a mussy material and it should not be mixed much ahead of daily requirements. If purchased ready to use it had best come in containers of one and half-gallon size. There will not be much waste from these

small containers. Every one around the shop should learn to rub roughstuff. It is an important part of the painting trade for the reason that no other material equals roughstuff for building up a fine, smooth and level surface; and part of this work of making the surface smooth and level belongs to the rubbing. Rub with water and artificial pumice stone or rubbing brick; these bricks



A NEAT CAPE-CART BUILT BY HUMPHRIES AND LAMMAS OF BLOEMFONTEIN, SOUTH AFRICA

may be bought in large, medium and small blocks, and of two or three different makes, as well as in several degrees of fineness. The medium-fine stone, and the finest to finish off with, are the two sizes which the small shop painter will have the most use for. In rubbing have a galvanized pail, three gallons capacity, soft sponge, and a supply of the rubbing stones. The blocks will need to be cut to different sizes as the rubbing goes on and parts of the surface show the need of certain shaped blocks and style of cutting. An old saw will be useful for cutting the blocks to the sizes desired. In the actual work of rubbing the roughstuff down plenty of water should be used; this for two purposes, namely: washing the surface off to see the cutting conditions, depth of rubbing, etc., and to keep the work clean and free from the stuff cut away under the brick, thereby avoiding scratching and gouging the surface. Hold the brick firmly in the right hand and do not allow it to turn or roll; when it does this it is likely to cut and mar the surface. Do not bear down too hard on the stone; this makes it scratch and gouge when any gummy substance catches under the stone. A firm, easy pressure on the stone, with a supple wrist movement, with the stone worked straight out and back from the shoulder, is the cor-

rect manner of handling the rubbing work. It will need some practice and experience for the workman to tell when the surface is rubbed enough. This may be told to some extent—to a very great extent, in fact—by drawing the dry finger hard across the panel at right angle to the rubbing stroke. If this process discloses rough welts and a brushy appearance of the surface, the surface is in need of additional rubbing; when the surface takes on a level and comparatively smooth appearance, with no brush marks visible, and no scratches or gouges, it is in fit condition to stand aside to allow the water to evaporate. This will require over night, or say, twelve hours.

There are, of course, other ways and methods to fetch the surface up to a point from which the coloring may begin. One of these consists in making the surface fit to paint, as already told, and then applying a coat of lead and some other color to match the final color to be put on the work. Have this carry one part raw linseed oil and three parts of turpentine, and apply like any paint coat. This will penetrate the surface cracks, if any, and give a good base to putty and putty glaze on. Take some of the hard putty above spoken of and with it stop up the deep cavities; then reduce some of the putty with a little turpentine, and with a broad scraping knife, using the pigment freely, draw putty or glaze all parts of the surface cracked or broken with fissures to any extent. The aim should be to get the putty worked out perfectly smooth without ridges or little threads of pigment; this will lighten the work of sandpapering, because when this putty glaze once dries it is like cement in its nature, and it requires hard and plenty of work to rub or sandpaper it down to a smooth and level condition. For much old work that does not have to be made of the finest quality this putty glazing method furnishes a quick and reasonably cheap, and a nice appearing surface to finish upon. It saves the rough stuff and some of the labor of rubbing, the latter being considerably greater than the work of sandpapering the putty and putty glaze material. Both methods help to avoid burning the old paint fabric off or taking it off with varnish remover, these latter methods to be taken up only as a last resort.

(To be Continued.)

THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING,
VEHICLE WORK and AUTOMOBILE REPAIRING

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THE COAL SITUATION

For some time past blacksmiths, in nearly every section, have been experiencing great difficulty in obtaining supplies of smithing-coal adequate to their needs. This has been due to a multitude of causes which may be all traced back to a common cause in the War. Railroad congestion, shortage of cars, labor troubles at the mines and in distribution, difficulties attending price adjustments, etc., have all contributed their share. Relief has been afforded however, in some localities, mainly those immediately contingent to the mines; but in most, we believe, the situation is still critical.

THE AMERICAN BLACKSMITH, in order to be of the greatest assistance possible to its readers, is conducting a Nation-wide survey to determine how prevalent these conditions are in affecting the small blacksmith trade and what may be done to relieve conditions.

We want to help Our Folks and, if you are having difficulty in obtaining sufficient coal for your own needs, write to Subscribers' Service at once, answering fully the following questions:

1—What price are you now paying for smithing coal?

2—Is such coal as you have been able to get entirely satisfactory as to quality?

3—What quantity do you order at a time?

4—If not at present ordering in car-load lots, could you arrange with other blacksmiths to do so?

5—What is your nearest receiving point?

FIRE PREVENTION

In a recent address, President Wilson said, "Preventable fire is more than a private misfortune. It is a public dereliction. At a time like this of emergency and of manifest necessity for the conservation of national resources, it is more than ever a matter of deep and pressing

consequence that every means should be taken to prevent this evil."

Every member of the craft should take to heart this timely injunction of the Nation's Chief. It has a special significance for the blacksmith, as the average smith-shop has proven a most prolific source of fires. And each and every one must realize that it is distinctly a matter of individual responsibility. There are fifteen hundred fires a day in this country and no one has the right to assume that all of these will occur upon the premises of other people. Resolve this day then that you will take every possible means to rid your shop of all possible fire hazards.

Remember, every preventable fire, little or big, is to some degree "an aid and comfort to the enemy."

HAVE YOU A BETTER PLAN?

When you read an article in THE AMERICAN BLACKSMITH, do you compare it with the plan you already follow for a similar class of work? Could you improve on the ideas expressed therein? Would you criticize the ideas of the author? Does the article bring to mind a scheme you have worked out for solving another and entirely different problem in your shop? Then why, Reader, why not tell us about it? Why not give brother readers the benefit of your own ideas along these lines? If our craft is to grow, if it is to keep step with the times, you must make known your ideas—pass along your own experiences, plans, schemes, shop kinks, etc.

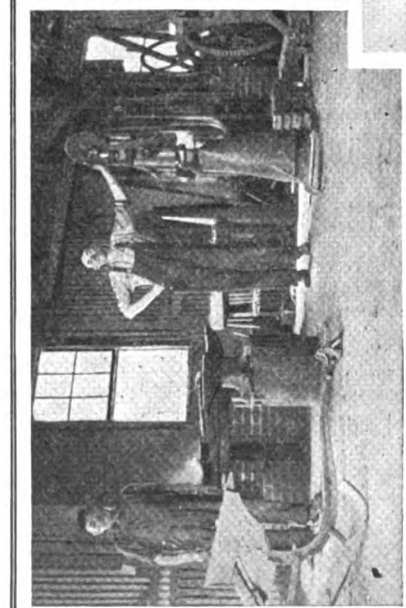
Don't give money to agents unless you are sure who they are. Every authorized AMERICAN BLACKSMITH agent will gladly show you his letter of authority to take your order. When in doubt, send money and order direct to Buffalo, N. Y.

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Some Live California Shops - WILL BISHOP



THIS is an interior view of Brother Stadler's Shop. The efficient-looking Iron Bruiser behind the plow is the proprietor, himself, the man who takes the "mon" out of Moneta. The young son of Vulcan beside him is the all-round mechanic who helps to make this operation painless to the inhabitants thereof.

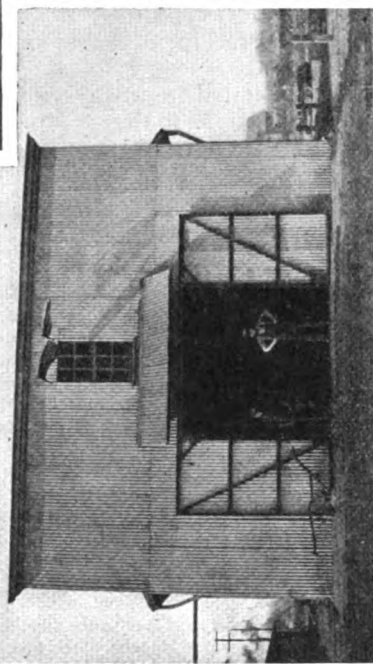
BELOW is shown Brother John Stadler's hustling smithy at Moneta, California. It houses a variety of motor-driven machinery which enables its proprietor to take care of a large and diversified business with the help of only one man.

Brother Stadler does a general smithing and horseshoeing business and his motto is "Good Work Done Promptly", for which he just as promptly collects cash. Old Man Credit and Brother John are not on speaking terms.



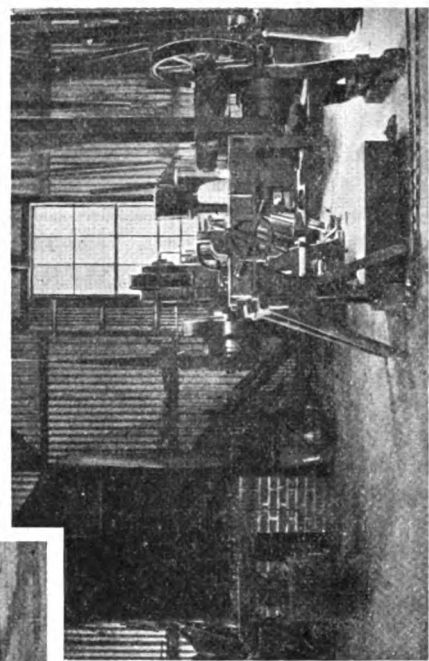
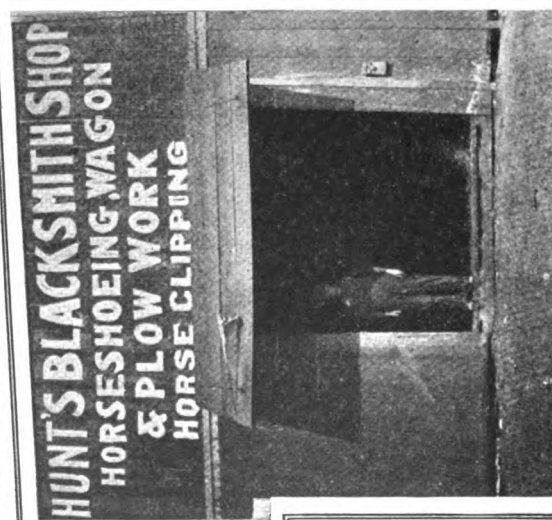
ABOVE is shown the Star Blacksmith shop at Redondo Beach, Calif. The man at the right, posed like Ajax defying the lightning, is Oscar J. Teed who is President, Chief Engineer and "star" workman of this thriving business.

The little man at the left is "Dad", general mechanic and all-round good-scout. Brother Teed has a hack-saw in his hand, and some might think he had just used it to saw a couple o' feet off'n, his assistant; but he hasn't. If you'll note closely, Dad has both the feet Nature gave him, and hasn't been sawed-off at all; just grew like that!



ON THE RIGHT is another view of Brother Stadler's shop, showing the first fire, power-hammer, and tire-shrinker. Note the floor free of scrap and rubbish. It's a rule in this shop to have a place for everything and everything always in its place. A diagram showing the arrangement of machinery, etc., will be found on page 86.

THOUGH his name is Hunt, he doesn't have to hunt for trade. It comes to him naturally because he's always on the hunt for new ways to please his customers. Brother Hunt's progressive shop, shown on the left, is located at Redondo Beach where he does a variety of work such as that indicated by the big sign over the door.





Co-operative Competition

By WILL BISHOP.

In which is preached the folly of cut-throat competition and the many advantages to be gained through application of the Golden Rule in Business. This is a message for YOU

BROTHERS of the leather apron and spark-burnt shirt fronts, I've written several spasms on the power hammer and other shop dope; and now, I'm going to unload on you a line of palaver that has lain heavy upon my chest for many years. And that has to do with the short-sightedness of the members of our craft, as a whole, in the matter of business competition. Blacksmiths, as a rule, are good workmen, good fellows, and good citizens; but there is one big, vital lesson that old John R. Experience has miserably failed to hammer into our knobs. It is not the fault of said John R. that we lack vision on the competition question—he has pointed out to us, year after year the folly of price-cutting and other methods of dirty competition, and has talked co-operation to us, shouted it, sung it, and bellowed it at us until his voice is getting raucous and harsh; yet we plod along in the same old way, eking out a poor wheel-barrow income, whereas if we had only listened to him, we could now be riding down Easy Street in a six-cylinder snort wagon.

Now then—though my name is Bishop, I've never followed the profession of preaching; but, in this article, I've a doctrine to preach; and, for this once, I'm going to live up to my name and expound to the best of my ability the gospel of Co-operative Competition. I want you fellows to imagine—it's a big order, I know—but I want you to imagine that I am Billy Sunday knocking the stuffin' out of the devil. My text is Co-operative Competition, and, in this case, Dirty Competition is the devil. And I want to say that he is a real devil—horns, hoofs, and all—to the smithing craft.

It is my aim to show up this devil in his true form, and to show you how to smother his activities under a big blanket of the right kind of

competition—the *co-operative* kind, which is constructive instead of destructive. I'm going to take off my coat, spit on my hands, and talk loud. I'm going to swing my arms and spout. I'm going to point out the rottenness of dirty competition and call things by their real names. Like the Reverend Billy, perhaps I'll jump on the table, and the chances are I'll kick it over; but, take it from me, I won't crawl under it. I may skin my knuckles on some of the lighting fixtures, and no doubt I'll bust a suspender; but I'm going to *tell you the truth!* So, if I say things that sound harsh, just remember that it takes a good, lively jar to awaken a sound sleeper. We, as a craft, are strong on that sleep stuff. Let's wake up!

For the purpose of drawing comparisons, I'm going to speak of conditions as they are in the average town of, say from two to five thousand inhabitants; and where there are from two to six smith shops. If you go into any one of those two or more shops for a chat with the anvil artist, and say:

"Well, Brother, how's business?"

He'll likely answer: "Oh, so-so; could be better."

The smith is busy, and there seems to be plenty of work on the floor, so you'll probe him a little for further information: "Huh, you seem to have plenty of work; what's the trouble with you?"

Can't you see him? Don't you know exactly what he'll say? I'll bet my hat you do! He'll scratch his head and screw around a little, but he'll come through with this reply right on schedule:

"Oh, sure; I get all the work I can do. Can't kick on that; it's the rotten prices we get here. They've—*they have*, mind you—'they've cut prices down in this town until none of us make anything,

no matter how hard we work."

Sad condition; but, by cracky; isn't it familiar? Think a moment—how many years have you listened to that kind of a whine? How many of you are standing in this fellow's shoes? What are you doing to get out of them and into a pair that would feel and look better on your feet? He'll never make enough to buy a new pair, and neither will you if you don't kick them off and *make* for yourself the right kind of foot gear. What did this man mean when he said "They've cut prices?" He simply meant—though probably didn't know it—that the devil of Dirty Competition had that town by the tail and was swingin' 'er around for fair! How about *your town*, Brother: has he got yours in his evil clutches?

Now, Brothers, this man's condition—the condition in his town—is familiar to all of us, at least on the surface. Let's tear the surface off and get right down to rock bottom. Who is to blame for the business condition of this town? Is it the other fellow? No, sir, they, in that town, and we in our town, and each and every member of the craft in any town, is personally and collectively to blame for poor prices and a long-winded credit system, if such conditions exist. Don't misunderstand me; they are *not all* bone-heads and cut-throats, and it is very likely that not a single one of them is. The chances are that most of them, at some other time or other, have been guilty of shaving the established price a bit *through lack of a proper understanding of his folly*. No one knows exactly where the trouble started, and each one blames the other. Herein lies the meat of the trouble—lack of understanding, and lack of faith in the other fellow. We fail to grasp that fundamental truth—that the good and welfare of



each one of us is in the welfare of all; that what benefits the community as a whole must, in turn, directly benefit us. Most of us are like the small boy who ate a hat full of green apples. He know the apples were not good for him, but when he was over with the belly-ache, he immediately ate another hat full. In one way, the boy shows up to an advantage over us: *he* waited until he had recovered from the belly-ache before eating another batch; we just keep on eating the green apples of rotten prices even though a griping financial belly-ache is keeping us a-jumpin'. For the love of Mike! let's get it through our domes that green apples are a profitless diet.

Now let's go back to that bird who said that *they* have cut prices. He wants to tell us some more about those rotten citizens, his competitors. All you have to do is to get him started on this pet topic of his and he'll tell you that Brown came to town about two years ago, started a shop, and right off the reel began slashing prices. Then some of the others thought they had to cut down theirs to meet the new man's prices, until, finally, they all had to. He'll tell you that Jones is a botch, that Smith is a drunk, that Jenkins borrows stock from other smiths and never pays it back, and that he can't buy a rusty nut from the jobbers without paying cash for it. Then he'll wind up by telling you that, by gravy, he don't speak to none of 'em!

Now, just what is wrong here? What is needed? What every hard-working, little-thinking, warp-visioned, really honest-at-heart smith in that town needs is for some one to inject a good shot of the spirit of Co-operative Competition into them.

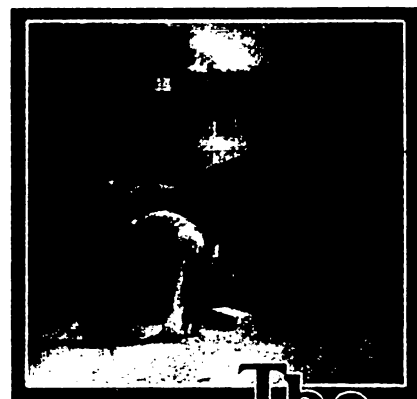
We all know what competition is. We'd know Old Ordinary Competition a mile away, and looking at him with only one eye. Our acquaintance with the old man has, in most instances, been painful, and we are suspicious all the time he is around. We know he is a very unreliable cuss, and is always watching for a chance to slip one over on us. Let's cut the old guy off our list of associates—drop his acquaintance, so to speak. When we do this we are ready to employ Mr. Co-operative Competition in his place to do the right sort of competing for us. And, believe me, this fellow is some competitor! Who is this guy, Co-operative Competition, you ask, and what is his line?

Well, in the first place, he is a well-known and very popular per-

son, though practically unknown to us of the smithing craft. All big institutions, corporations, and large business enterprises, employ his services exclusively. *He is the spirit of ORGANIZATION. And organization is the foundation, bone and sinew, flesh and blood, and the whole works of ANY successful business!* Think it over. We are prone to cuss Big Business, and in strict justice we have cause to condemn many of the misuses of their power, but the ground-work, the fundamental principle which underlies that very power is organization, co-operation of every unit connected in any way with the enterprise—the stuff that makes every successful business on earth the success it is. Of course, we can not, and do not, expect to build the smithing business of the country into a vast and bloated corporation. That is out of the question; but, it is in our power to pattern our methods after those of the Big Interests in so far as they can be applied to our own humble line. By Big Business I don't mean any of the great single corporations of the country such as Standard Oil and others of that class. I mean, rather, such organizations as the many Merchants and Manufacturers Associations throughout the country — Producers Associations, and so forth. These associations have the right idea. They employ the service of this guy, Co-operative Competition, with the result that, while the members of the association are still competitors in the field of business, they co-operate as a whole in cultivating and fertilizing that field up to the limit of production, each member thus reaping a harvest of business prosperity that is utterly impossible under the cut-throat system of competition that exists almost everywhere among us knights of the hammer. How do they do it? Why, they get together, organize, form an association—anything you care to call it, so long as it is done. They ignore old Personal Animosity entirely in any business deal, and in everything that pertains to business prosperity. They adjust prices, set a limit on all credit extensions, discuss and devise rules for the collection of accounts, and, through the association, keep in touch with everything that tends to build up and to keep successful the business of each individual in the association. Now, by the great horn spoon, why can't *we* do it? We can! *But, what is the reason we don't?* Craft jealousy, petty

animosity, distrust, suspicion,, lack of faith in our brothers—all of these things are ours, and they are the stumbling blocks that keep our business shins skun to a frazzle. Suppose each of us appoints himself a committee of one to start the Co-operative Competition ball rolling. Let's go over to our competitor's shop, poke him the glad mit, and say—honestly and sincerely: "Bill, let's forget it! Let's get together, and *stay* together!" Bill is a good scout, even if you haven't thought so before, and he'll meet you half way and say: "Put 'er there!"

So, when all us Bills and Johns and Georges and Henrys have done this manly thing, a large and knowing smile will come onto the face of Mr. Co-operative Competition; and he will immediately roll up his sleeves and kick the stuffin' of this guy, Dirty Competition! Our business shins will then begin to heal, and being healed, will remain so. After that — well, we should worry about the H. C. of L.!



The Horseshoer

Pushed Up Inside Heel

A. L. CAMP

The hoof of the living horse is not a rigid body as the bones but is a live growing material with an elaborate circulatory system in all its parts, and is therefore highly sensitive to both exterior and interior conditions. Being thus responsive to certain conditions and owing to fact that its continuous growth and flexibility is the result of an insufficiency of nutritious food—sickness of any description—unlevel bearing, improper angle, etc.—serves to retard or derange its natural growth and shape. These effects are manifested by rings, quarter-crack, uneven slope of the walls, pushed quarters, dished toe and numerous other malformations.



THE AMERICAN BLACKSMITH

—From the St. Louis Republic.

Even in a natural state the hoof is subject to more or less of these injuries, but under the artificial life the animal is forced to live, the causes are much increased. Of these causes by far the greatest is connected with shoeing. Hence shoeing with a view of preserving the functions of the foot is unquestionable.

As nature has endowed every part of the foot with the power of individual motion, and as exercise is essential for its growth and health,

shoeing should conform to the utmost freedom of action.

The quotation below is from John W. Adams A. B. V. D. and is put in better form than I am capable of:

"A hoof while supporting the body weight, as a different form, and the structures inclosed within the hoof have a different position than when not bearing weight. Since the amount of weight borne by a foot is continually changing, and the rela-

tions of internal pressure are continuously varying, a foot is, from a physiological viewpoint, never at rest. The most marked changes of form of the hoof occur when the foot bears the greatest weight, namely, at the time of the greatest descent of the fetlock. Briefly, these changes of form are: (1) an expansion or widening of the whole back half of the foot from the coronet to the lower edge of the quarters. This expansion varies between one-fiftieth and one-twelfth of an inch. (2) A narrowing of the front half of the foot—measured at the coronet. (3) A sinking of the heels and a flattening of the wings of the sole. These changes are more marked in the half of the foot that bears the greater weight.

"The changes of form occur in the following order: When the foot is set to the ground the body weight is transmitted through the bones and sensitive and horny leaves to the wall. The coffin bone and navicular bone sink a little and rotate backward. At the same time the short pastern sinks backward and downward between the lateral cartilages and presses the perforans tendon upon the plantar cushion. This cushion being compressed from above and being unable to expand downward by reason of the resistance of the ground acting against the



horned frog, acts like any other elastic mass and expands towards the sides, pushing before it the yielding lateral cartilages and the wall of the quarters. This expansion of the heels is assisted and increased by the simultaneous flattening and lateral expansion of the resilient horny frog, which crowds the bars apart. Of course when the lateral cartilages are ossified, not only is no expansion of the quarters possible, but frog pressure often leads to painful compression of the plantar cushion and to an increase of lameness.

*** Under the descent of the coffin bone the horny sole sinks a little; that is, the arch of the sole around the point of the frog, and the wings of the sole become somewhat flattened. All these changes are most marked in unshod hoofs, because in them ground pressure of the frog and sole is pronounced; they are more marked in fore hoofs than in hind hoofs."

"The movement of the different structures within the foot and the changes of form that occur at every step are indispensable to the health of the hoof, so that these elastic tissues must be kept active by regular exercise, ***"

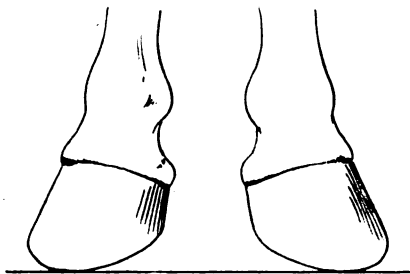
The foot that is laterally level has its groundbearing surface at right angles with the bones of the leg. If one side or a portion of a side is lower than another, the lower part will bear a greater part of the weight of the animal and the higher parts correspondingly less. Where the surplus weight is borne the wall of the hoof from ground to coronet will be pushed upward, while those parts bearing less will descend. Consequently instead of the coronary band being of horizontal regularity it will be undulated. Measured from ground surface to coronet the distance will be greater and gives the impression that the hoof is high at this point.

As the heels are less rigid than the forward parts of the hoof the upward push is far more pronounced in them and as the tendency seems to be with the majority of shoers to dress the hoof lower on the inside of fore feet and outside of hind ones, those parts are the ones more generally so affected.

The horse with inside pushed-up quarters stands with its fore feet much wider apart than is natural and a plumbline dropped from the shoulder would fall inside of the center of the foot and mayhap inside of the foot altogether. This

alone proves the inside of the foot to be supporting more weight. The outside being relieved of its just share comes down. In such cases the foot leveler does not register the exact condition, for it will show the outside to be the higher when in reality the reverse is true. The deception is the result of the inner coronet being pushed up and the outside descended.

Animals affected as above are most always knee knockers, sometimes ankle hitters, are inclined to



FEET WITH PUSHED-UP INSIDE HEELS

pulling the front shoes with the hind feet and also tire more quickly from the extra exertion necessary for locomotion.

Several shoeings are usually needed to return the foot to normal. The shoe should be thicker inside, webbed and outside thinner, with inside full width and outside rolled from heel to toe, making a bevel of about half the web's breadth. This brings the weight bearing nearer the center of the foot at outside which then must more nearly bear its proportion and, having widened the inner side by the full web, it is relieved of some of its surplus burden. With such re-distribution of weight bearing, the foot will tend to return to a correct shape. After a month or six weeks repeat the process and so continue until a cure is effected.

Such feet usually have corns, or more properly speaking, local laminitis, from the crushing of the laminae between the coffin bone and wall of the "run-in" heel. This will disappear as the foot regains its contour.

Hind feet seldom have the inside quarters pushed up but often the outside ones. The reverse condition is the case as in these the outside is low. Use the same type of shoe reversed—that is bevel—inside web.

As illustrative of the foregoing, I will cite an actually treated case: a horse of high breeding and general excellence, and having been a money winner as a pacer for a season or

two, became erratic in track deportment, and although in the past had had plenty of indurance, was now short of wind and unable to carry its clip for the mile. A balanced pacer should place its feet in line when at speed so that each track would show to be paced on a line the width of a buggy track when going straight away. This horse's footprints showed the fore ones to be straddling, that is, landing outside—and the hind ones falling inside of this line. The hind feet were shod right but landed inside the line they should have, as an offset to the faulty front action to preserve the animal's equilibrium. When standing, the toes of the fore feet pointed outward—the feet were too far apart. Behind, the feet occupied a natural position except were too close together. When the fore feet were up-lifted and the pasterns flexed the toes pointed in so much that at the passing of the knee the hoof touched the hair of it. On extending the foot forward and downward as in the act of landing, the toes tended outward until they rested toe wide as in standing position. Or to describe the flight direction—the foot left the ground toe wide, gradually flew inward to the passing of the knee—thence outward to the landing. Unlevel dressing had deformed the hoof by inducing unlevel weight bearing until the inside heel was pushed up and under from being too low and having to bear the greater weight—the inside toe wall was "flaring"—that is, less perpendicular than was right, and consequently more extended than it should have been and having more leverage, bore less weight. The outside toe wall was perpendicular and was bearing an added burden that its opposite was evading; while the outside heel was prominent laterally and descended and failed to carry its share of weight of which the inside was burdened.

As feet so described cannot be reduced to a normal state by cutting alone, the principal reliance having to be auto-adjustment, I acted as follows: A shoe was prepared true in shape and of the proper size. This was laid on the foot in such a manner that when the ankle was flexed the shoe pointed straight. The result was the shoe projected slightly over the inside quarter, was deficient at inside toe; projected over outside toe and was deficient under outside heel. I then lowered a space of approximately two inches at inside toe and outside heel. This left



the bearing surfaces on inside heel and outer toe. This is an anomaly and an apparently contrary treatment for the desired effect because of apparently placing the bearing on those parts described as bearing excessive weight. But the effect will be found to be as desired. For in a short while the lowered parts that are not in contact with the shoe will descend to it, and will become the low parts where previously they were the high ones, and being lower will assume their duty. I did not draw the nails tight—only enough to hold the shoe safely. I then dressed the hoof on side with the rasp to conform in shape to the shoe as nearly as possible by removing the projecting inside toe wall and also rounded off the wall of the outer heel. The animal was much improved at once and with a second shoeing three weeks later on similar principle, but less radical, the feet regained their proper shape—the foot flight was true—the tracks fell in line—the endurance and speed returned and the horse was again a satisfactory racer.

It will be noted that the advocated treatment and the actual treatment differed in that the former used a partly rolled shoe and the latter a plain one, the first was for road or work patients whose feet were practically straight and the locomotion required did not cause knee knocking, and where it mattered not if a few weeks elapsed for recovery. The latter case involved a race horse in preparation where

time was precious and where the lightness of the shoe prohibited much result from rolling or bevelling.

The Oxy-Acetylene Plant—10

Its Installation, Operation and Torch Manipulation

DAVID BAXTER

Cooling

At this point in the welding process a great many torch operators become careless. Instead, they should be more careful than ever. If we have kept up the preheating and reheating, we know the expansion has been kept at its maximum which is necessary in order to regulate the cooling.

After the welding is finished and the torch removed, the expansion stops and the contraction, which is the effect of cooling, sets in—almost the instant the preheating fire is removed or shut off.

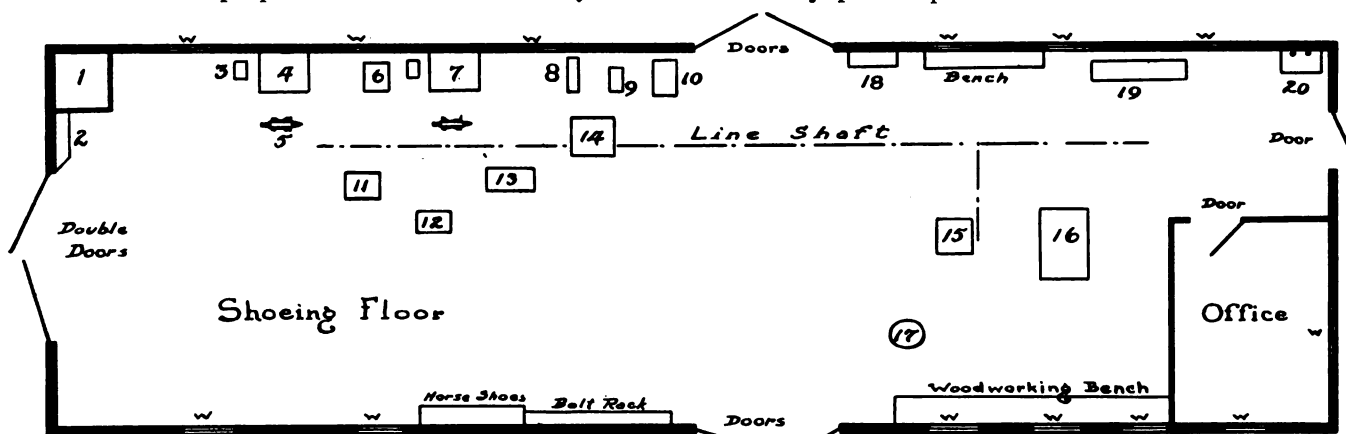
When we preheat we cause the structure or grains of the metal to stretch apart as has been explained. When the cooling sets in these grains endeavor to rearrange themselves, or to pack or knit close together. This closing up of the structure does not stop until the metal is almost cold.

The heavier parts cool slower and therefore contract slower than the lighter parts. We should try to restrain the cooling of the lighter parts and have them reach the cold stage at the same time with the heavy parts. Or in other words we should try to have the heavy parts

cool as fast as the light parts. If we do not succeed in controlling or regulating the cooling contraction, the heavy parts will tend to pull away from the cold or fully contracted parts. The result is a strain or an open fracture. This crack is greater in proportion to the difference in the cooling of the two parts. It is evident then that we should be certain the different parts of a job are cooling about the same.

This is the more easily done by banking, or covering the whole job with a non-conductor. The principal effect of this banking is to prevent rapid radiation. Or in other words it holds the heat in a body, allowing it to radiate only around the entire bank, at nearly the same rate. This promotes a normal cooling. Of course it is impossible to bank all large jobs, but even they should be covered as far at least as the heat has traveled, by conduction, from the weld.

A method successfully used to regulate contraction is to cool the heavy parts artificially. This is done by using wet cloths or pouring water upon the heavy parts, being careful not to allow the water to splash or run onto the light parts. This artificial cooling is sometimes done as the weld is made. With this method we do not have to regulate the preheating so much. And yet, in effect, we do regulate the preheating, because while we are cooling the heavy part we must watch very carefully the heating of the light part. In fact it is better that the



FLOOR-SPACE DIAGRAM OF BROTHER STADLER'S SHOP (ILLUSTRATED IN FRONTISPIECE) SHOWING ARRANGEMENT OF MACHINERY AND EQUIPMENT.

The building is 30 x 100 feet and one story high, built of galvanized iron with concrete floor throughout. Thirteen windows furnish a plentiful supply of light and the three big double-doors give ready access to all parts of the shop. The equipment consists of two forges (4-7) and forge tools (in rack at 6), power-hammer (11), heavy tire shrinker (12), power-threading machine (13), power punch and shear (14), grindstone (8), emery wheel (9), drill press (10), shaper (18), lathe (19), and a combination wood-worker (16) which has all desirable features for sawing, boring, planing, and tenoning of wood work. The machinery is driven by a high-powered electric motor (15) from a single line-shaft. Other equipment is represented as follows: (1)-coal bin, (2)-bench, (3)-power-driven blower, (5)-anvil, (17)-wheel rack, and (20)-wash basin. Altogether, this is the cleanest, most up-to-date shop in this part of the country, and represents an investment of approximately six thousand dollars. Note the large floor space and the admirable spacing of machinery. It is a real blacksmith shop.

novice should not use this method if the casting to be welded has *very* light sections. The method is all right for such work as welding teeth onto heavy gears, etc. The operator is further cautioned not to hurry the cooling unless he understands his business thoroughly. This applies to irons, steels and aluminum.

When welding copper, brass and their alloys he may hurry the cooling to the extent of cooling by quenching or dipping the welded piece in water.

One effect of sudden cooling is hardening. Of course, in special cases, this is beneficial and is done for a purpose. Otherwise it is harmful because it makes the metal hard to file or drill. The water is poured upon hot iron or steel it causes the surface-metal to set and knit sooner than is normal. This causes a thin skin of very hard metal as has been explained in a previous chapter. The hardening for a special purpose is called case-hardening and is a special subject in itself.

Sure cooling is slow and patient cooling. It is well to remember this if one is a beginner. Some jobs require as much as twenty-four hours' cooling before it is absolutely safe to uncover.

A great number of jobs, such as auto crank-cases and cylinders, require 6 to 12 hours, depending upon the amount of preheating and welding.

There are some classes of work that do not require either preheating or cooling. These include such as straight bars, either flat or round or square; if square or round, they may be almost any diameter; if flat, they should not be over a few inches wide; if thin, in the case of such bars, the expansion is all or nearly all lengthwise and the contraction toward the weld again; if the bar is free at both ends it will contract and expand without harming the metal or weld.

Very small castings may be welded without preheating and cooled, or allowed to cool, without banking. Their expansion is so equal and so small as to be negligible. They may be placed anywhere out of a draught and allowed to cool at will. This class includes such as gun hammers, locks, small stove repairs, etc.

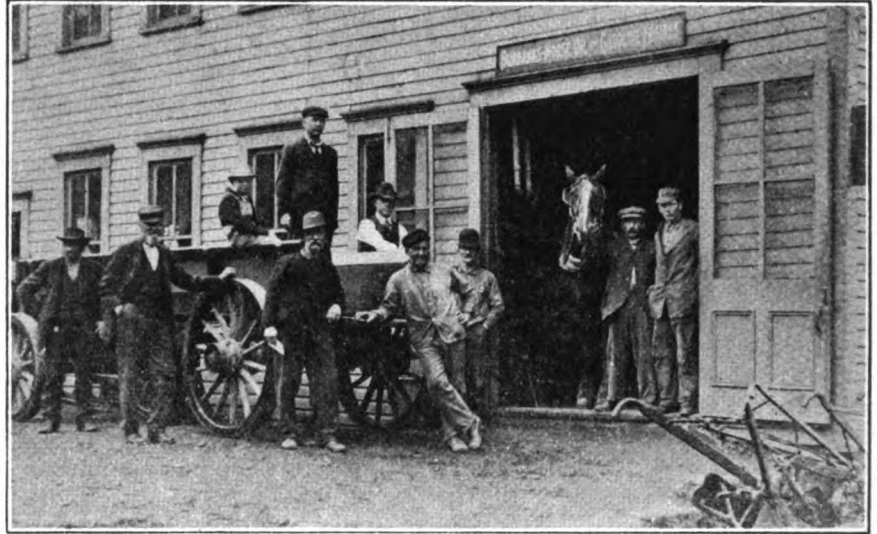
The beginner should practice the art of cooling, for by learning to regulate it he can save much valuable time.

Cold Finishing

The general appearance of a welded casting is often deceptive. It leads the uninitiated to believe that the weld is a very poor piece of work even when the weld is as strong or

hances the appearance of strength or reinforcing. The customer is better pleased because he can readily see the greater strength of the weld.

Another good idea is to paint the finished weld some color correspond-



MR. ALBERT DAETWYLER'S BUSY OHIO SHOP

stronger than the original casting. Very often the line of the weld looks like a splatter or smear of half melted metal. This is especially true of cast-iron or aluminum.

Welds, that for various reasons can't be hot-finished or hammered, must necessarily look crude or unfinished unless cold-finished. It is worth the operator's time to do a little cold-finishing to every weld. Worth it for his own satisfaction and doubly worth it because his customers or most of them are ignorant of the process and judge mostly by appearance. It is poor advertising to have them think the work has been done in a careless or slovenly manner. If they think it they will generally say what they think—and it may be to a prospective customer. So let us forestall any knocking by "slicking up" the weld.

Most of us do not need to be told what to do, but perhaps a few pointers may help us to remember.

The line of weld should be ground or filed down level with the surrounding metal. Sometimes parts of the weld can not be reached with a file or emery-grinder. In this case a thin-blade, sharp-edge chisel will remove most of the roughness with little danger of breaking the weld.

A good-looking finish is made by grinding the edges of the line of weld more than the centre. This leaves a raised or curved section of metal along the weld which en-

ing to the balance of the work. Often it requires but little paint to cover the entire casting and this gives an added effect worth while.

You will find it pays to do these things on all jobs. Of course it does not pay to cover up really defective welds with paint, because they are bound to discredit the operator. But welds often look defective when they are just as good as is necessary for their class.

After grinding and filing an aluminum casting, give it a coat of aluminum paint. If the grinding has been carefully done and a coat or two of aluminum paint applied, it is difficult to tell where it was welded.

The inside as well as the outside should be finished for appearances sake. Steel, wrought-iron and ductile metals may be cold-finished with a hammer if they are strong enough to withstand the hammering. With a hard-faced hammer we can drive back and flatten the uneven appearance of the cold weld.

If possible, the welding shop should have a half dozen or more different shapes and sizes of emery-wheels for grinding grooves, slots and bevels. The operator is more often called upon to grind and finish sharp corners or fancy work, than just plain surfaces. He should be equipped to follow the original design of the casting.

(To be Continued)



A Coupe Body for the Ford Chassis

There is an ever-increasing variety of bodies for service on the Ford chassis and in the accompanying drawing is shown plans for building a substantial Coupe type which will make a useful and comfortable car.

Its special feature is its utility in cold and wet weather, although the Coupe body is preferred by many, especially professional men, all the year round.

This body can be built at a comparatively low figure as the construction is similar to that of an ordinary single seater, except that the door pillars are carried to the roof.

The front part is fixed, only the back being lowered. This does away with the cumbersome top when lowered and helps to lower the cost of production.

The high front door remains fixed in the front part when the back is lowered and serves admirably in the way of protection.

The scuttle dash is built on to the front of the body, and is fixed after the front section is framed up and fixed. The bottom sides are lowered over the edge of the chassis, leaving the top of them level with top of chassis, and the floor boards on top of them. This helps to make the body look more proportionate, besides making the step for access lower.

The door, and doorway pillars, will be cut from three-inch timber; and the bottomsides from two-inch. The back elevation of the side pillar shows the shape to which patterns will need making. The roof is simple in construction, and consists of two side rails cut to shape shown, and roof sticks fitted across to pattern. This can be covered with iron on top, and

cloth inside. The back is best covered with good leather, and a knuckle joint to keep it in position is advisable. The boot is made by cutting a panel of kauri to the shape and screwing same to bottomsides and to the back pillars of the body. Two cross bars from the door opening, and the door is hinged forward.

The seat is made high enough to allow for a gasoline tank being fitted underneath, but the ordinary Ford tank is too high. A good method of adjusting this tank is to take off the two ends and crush the tank into an oval shape, fitting new ends. The wind screen is rabbetted into the pillars, and the top half is made to open forward, on hinges from the top. Various means of adjusting and fixing are available. Painted in a suitable colour, this makes a smart looking car.

—From the *Australasian Coachbuilder and Wheelwright.*

The United States Food Administration Says—

Waste Not—Want Not!

Now, more than ever, does this old proverb hold good—"Waste not, want not!"

"But we are not wasters," some of you and your good wives will indignantly say. "We can't afford to be." Of course you cannot afford to be. But aren't you?

How many slices of bread were left in the tray after dinner yesterday? What was done with them?

"Why," you say, "what can we

do? One can't know just how many slices of bread are going to be eaten."

The King of England knows. He cuts his loaf of bread at the table, each slice as it is needed. Why can't you?

How much butter was scraped from the butter dishes?

If the butter-dish is put right on the table, and each person uses just what is needed, there wouldn't be any scrapings.

How much food was left on the plates; and what was done with the unserved food on the platter?

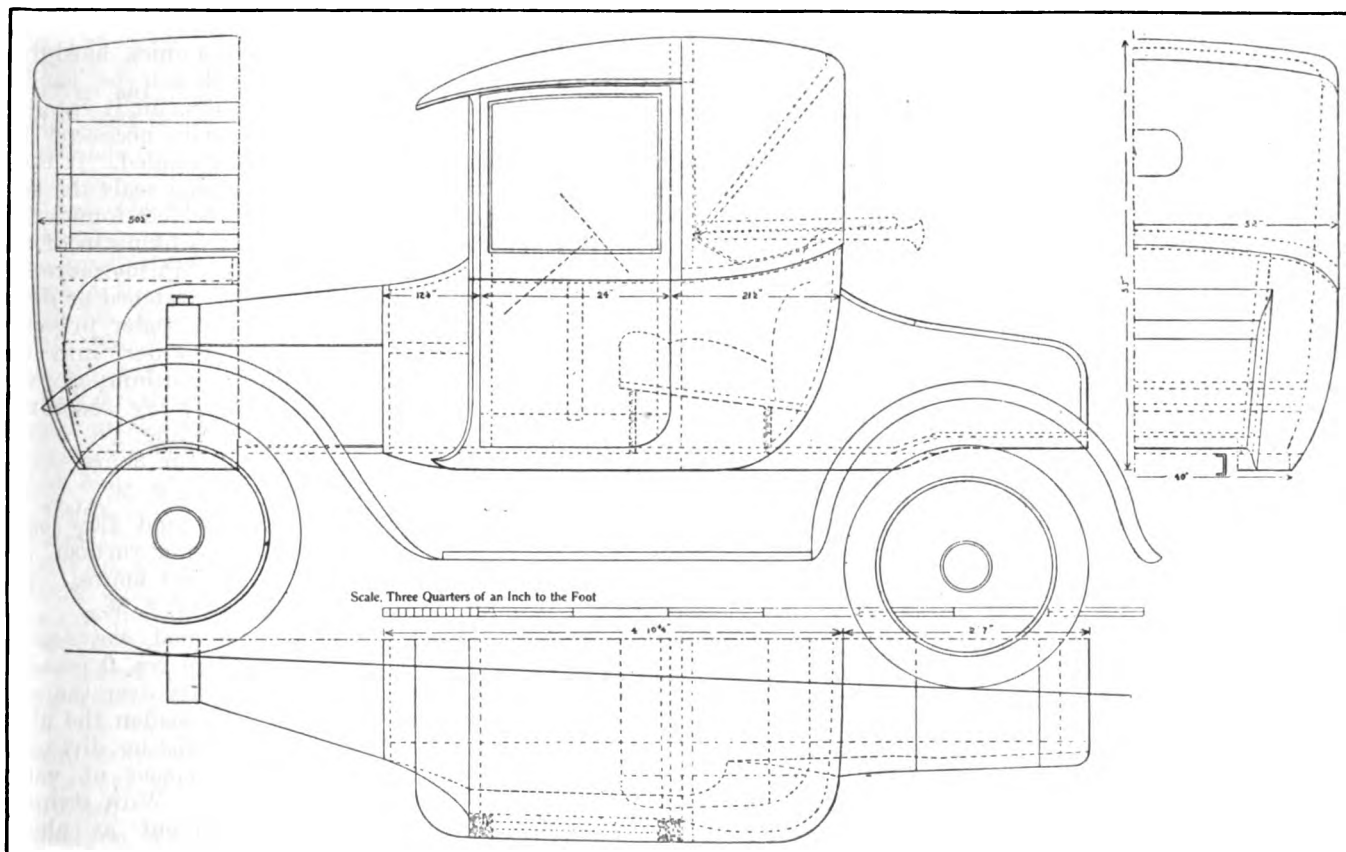
No more than is absolutely needed should be cooked. Observe the rule of "Clean Plates" in your home.

What about the half cup of milk left last night? Was it thrown away because you thought it wouldn't keep until tomorrow?

Sour milk man be used with soda for quick breads, cookies, corn bread, ginger bread. And it makes delicious cottage cheese.

What was done with the fat after it was used for frying potatoes? Was it thrown into the garbage can, or was it saved to be used again?

Ask yourselves — how many of these things have been done in my



DETAILS OF CONSTRUCTION FOR A COUPE BODY FOR THE FORD CHASSIS
(NOTE: The actual scale in this reduced drawing is $\frac{1}{2}$ inch to the foot instead of $\frac{3}{4}$ as shown.)



home that should not have been done!

And remember that we cannot be kept from wanting unless we keep from wasting.

Acquaint your family with these facts.

"United we eat, divided we starve."

The Motor Car Paint Shop—IV*

A Series of Helpful Articles on Painting and Re-painting the Automobile.

EDITOR'S NOTE:—The painting of an automobile is a difficult job at best, requiring the skill and experience of the well-trained professional painter to secure good results. Hence, for the automobile repairman, who has had little experience in this direction a careful study of tried and proven methods is prerequisite to success.

There are many systems in vogue, each possessing its special advantage, such as quick drying, ease of application, cheapness, etc., and among these it is easy to find one or more especially suited to the requirements of your shop.

The following describes the method recommended by one of the large paint and varnish manufacturers and in use by several of the prominent automobile factories. It will serve to illustrate a typical, standardized method.

The first system is a quick system for hurried work where speed is considered of more importance than best results. It is designated as the *Celox system* and may be applied from the wood or metal up in five or six days, if absolutely necessary. It is in use in hundreds of shops and the results obtained are good, if not the best. The cost of painting a car with this system is smaller than with any other. This is true both of material and of labor cost. A big limousine car may be painted with the Celox system with from five to six dollars' worth of painting materials, and in perhaps thirty-two hours of actual labor, as follows:

Materials:

Celox metal primer or wood primer, 1 qt.
" knifing-surfacer—2 coats....15 lbs.
" sealer1 qt.
Color varnish.....2 qts.
Finishing-varnish1 qt.

Labor:

Primer1½ Hours
Putty-up5 Hours
Two coats knifing-surfacer....7 Hours
Sand and celox sealer.....8 Hours
Color varnish.....2½ Hours
Stripe- and finishing-varnish...8 Hours

The second system, known as the "Three V" system, is for the medium and finer grades of work. Some-

what more material is required, though not much, and the job requires about double the amount of time for the minimum of the Celox system. Work done with the "Three-V" system can be charged for at a higher rate and will reflect greater credit on the paint-shops turning it out.

The third, called the *Ideal system*, is for the highest grade of work and is the system in use in the finest shops in the country. This system should be used in all cases where the car-owner has time and wants the best. The best prices may be charged for this work, for it insures the best results.

The Celox Rapid System

Schedule for Painting and Finishing Metal Bodies

FIRST DAY

Clean scale, if any, from the surface with a wire brush. Then go over it carefully, rubbing hard and strong, with emery cloth preferably, or scour surface with No. 1½ sandpaper. Dust off and apply with a soft-point brush, round or oval, one coat of Celox metal primer, a smooth, free-working material specially adapted to metal. Lay on an even coat of this primer, well brushed out, a fundamental virtue of which is that it requires no wiping off, thus reducing the cost of application to the minimum. Celox metal primer is additionally valuable from the fact that all its elements of strength, capacity for expansion and contraction, and its elastic properties in general are left undisturbed on the surface and in the minute pores, where they belong. Moreover, Celox metal primer has a powerful affinity for succeeding coats, welding them to the surface and imparting to them something of its own resisting properties.

Let dry twelve hours.

SECOND DAY, A. M.

With a soft-point brush apply a coat of Celox knifing-surfacer (sanding-surfacer), first having thinned the surfacer with pure turpentine added gradually and beating to a cream-like paste if desired. Allow this coat to thicken through evaporation (say for ten minutes) to a point where, with a broad-blade scraping-knife it may be knifed down to all coarse patches of surface and level up inequalities, making the surface compact, dense, level and perfectly smooth.

To save time and consequent expense, the knifing may be dispensed with if care has been taken to apply a smooth and even coat.

This surfacer, in case of quick work, is possessed of manifold advantages, among which are its pliability, elasticity, bodying-up property, density, adhesiveness, and easy-working qualities.

These are invaluable virtues in building over a metal base under the restriction of an abbreviated time allowance, and insure a foundation to withstand practically every form of severe service.

Another important advantage of Celox knifing-surfacer (sanding-surfacer) is that it is furnished in various shades so that it can be successfully used in rapid-method work both as a superb surfacer and as a groundwork for the color coats. In addition it can be baked if desired.

Let dry six hours.

SECOND DAY, P. M.

Using first No. 1 sandpaper, and lastly polishing off with No. 0 sandpaper, surface the Celox knifing-surfacer (sanding-surfacer) down to a uniform, smooth condition, like a surface rubbed with water and rubbing-stone; but *do not* scour this material with stone and water.

Dust off.

Apply a light, even coat of Celox sealer well brushed out, using the material just as it comes from the can.

Celox sealer is an absolutely essential article in any quick system. It permits the use of a quick, hard-drying surfacer which can be sanded with the best results, for it supplies the life and elasticity necessary after the surfacer is sanded. It thoroughly permeates and seals the surface, providing a perfect foundation which prevents the sinking in of the subsequent coats. Furthermore, if the finish becomes scratched or dented in use the Celox sealer prevents the penetration of water into the undercoats during washing or wet weather and does away absolutely with flaking and peeling.

Let dry twenty-four hours.

THIRD DAY, P. M.

Dust off surface and flow on a coat of vanadium color varnish.

Let dry twenty-four hours.

FOURTH DAY, P. M.

With a soft felt pad, water-moistened and dipped in No. 0 pumice-stone flour, go lightly over the surface sufficiently to deaden the gloss and flick off any existing dirt-nibs.

Flow on a second coat of vanadium color varnish. With striping to be applied, rub out as above, stripe and flow on a full, rich coat of vanadium double-quick rubbing varnish.

*Courtesy Valentine & Company



Allow this coat to dry eighteen hours.

SIXTH DAY, A. M.

In case of either vanadium color varnish or vanadium double-quick rubbing varnish having been used, proceed first to rub the surface firmly and uniformly, finishing off by omitting the pumice-stone flour and substituting a water-rub to clean up the surface. After this finish with vanadium body varnish, a wonderfully free and safe-working varnish, even over the largest panels, yet one which sets promptly out of the way of dust, and excels in depth of body and brilliancy.

Repainting Old Work

Over an old-paint surface, scraped and washed down to a solid foundation, or burned off, use Celox metal primer, for both wood and metal work.

On old work where cost or time has not permitted the absolute removal of all cracks in the paint materials, a sufficient number of coats, applied in the manner described above, of Celox knifing-surfacer (sanding-surfacer) to "fill up" these cracks, can be used to better advantage than the employment of so-called crack-fillers. The work should be done exactly as detailed above except for the addition of the extra coats of Celox knifing-surfacer (sanding-surfacer), only the last coat of surfacer need be sandpapered.

Over old painting always prime with Celox metal primer.

Schedule for Painting and Finishing Wooden Bodies

FIRST DAY, A. M.

Upon new wood, first cut down all the up-starting grain, if any, and remove the particles of wood fiber with No. 1 sandpaper, finishing off with No. 1/2 sandpaper to a fine, smooth surface. Dust off, and with a soft brush apply a coat of Celox wood primer, which, like the Celox metal primer, requires no wiping off with cloth or other material.

Celox wood primer quickly penetrates the pores of the wood, seals them up, and lays secure hold on the fibers and offers an ideal primary foundation for succeeding coats. Important, too, is the fact that it will dry smooth, making sandpapering unnecessary to prepare the surface for the succeeding coats of filler, paint or varnish.

Let dry twenty-four hours.

When Celox wood primer is applied on metal parts always wipe off the excess primer.

Celox wood primer offers a su-

perior foundation for and works in perfect harmony with Celox wood filler for work to be finished in natural wood.

For an old-paint surface, scraped and worked down to a solid foundation or burned off, use Celox metal primer instead of Celox wood primer.

The Celox metal primer is recommended because it has the quality of remaining on the surface, while the Celox wood primer is made to penetrate the pores of the wood.

Let dry twelve hours.

SECOND DAY, A. M.

With a soft-point brush, after adding turpentine and beating to a cream-like paste, apply a coat of Celox knifing-surfacer (sanding-surfacer).

If desired to knife, allow this coat to thicken through evaporation to a point where, with the broad blade, half elastic scraping-knife it may be knifed down to fill all coarse patches of surface and level up existing inequalities, making the surface compact, dense, level and perfectly smooth. Give six hours to dry.

SECOND DAY, P. M.

Using first No. 1 sandpaper, and lastly polishing off with No. 0 sandpaper, surface the Celox knifing-surfacer (sanding-surfacer) down to a uniform, smooth condition, like a surface rubbed with water and rubbing-stone; but do not scour this material with stone and water.

Dust off.

Apply a light, even coat of Celox sealer well brushed out, using the material just as it comes from the can. (For description see page 24.)

Let dry twenty-four hours.

THIRD DAY, P. M.

Dust off and flow on a rich, strong coat of vanadium color varnish, per-

mitting the coat to dry twenty-four hours.

FOURTH DAY, P. M.

Rub the surface out and carry through the same processes advised with respect to rubbing, stripping, and applying second coat of material, either color varnish or clear varnish, noted in case of metal bodies. (See page 25.)

Allow this coat to dry thirty-six hours.

SIXTH DAY, A. M.

Rub out and finish as in case of metal bodies. (To be Continued)

The Value of Scrap in the Shop

ANTHONY ZEMAN

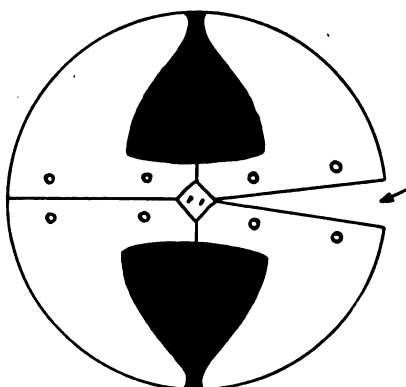
It is well to be aware of the fact, these days, that enormous piles of scrap are anything but fortunes lost. Those piles of scrap which accumulate in every shop and usually pass directly into the hands of the junk dealer may be turned into sources of profit if judgment and a little thinking is used.

Let me illustrate, by a single instance, how this may be accomplished. It is a common occurrence among members of the craft for numbers of old disc plates to pile up. Now scrap of this type may be utilized to advantage and converted into useful articles that will add a nice sum to the smith's income. It is possible, for instance, to make four tin cutters from each disc, and just how profitable this should be is indicated by the following figures: one disc plate making four cutters, a whole set will give about eighty cutters. At, say, \$.75 per cutter, our profits would be \$60.00 from the set. Quite a difference from what the junk dealer would be apt to pay for an old disc cultivator!

Now to shape these cutters, proceed as follows: take a disc plate, heat, and cut from the center hole to outer edge as shown in accompanying illustration. Then lay out size of cutter and drill two holes as indicated in each section. Polish and temper and you will have the best pin cutter ever put on a plow.

These old disc plates will also answer well for anchor rods used in setting corner posts and so on, requiring no work whatever other than the simple operation of removing them from the cultivator. All that is required is to slip the rod through the square hole in the center.

I might point out many other ways in which scrap could be util-



UTILIZING SCRAP FOR PROFIT

Mr. Zeman's idea of making four tin cutters from one disc-plate. The arrow points to the opening caused by straightening the disc.



ized, but I believe a concrete illustration such as the above will serve the purpose. The main thing is to get brethren of the craft to look around for themselves, do a little thinking and then get busy. It pays to keep one's eye peeled for profits in scrap.

Winter Rules for the Care of the Horse



THIS circular is prepared by the Boston Work-Horse Relief Association, whose office is at

15 Beacon Street, Boston, Mass. They also publish Stable Rules, Drivers' Rules, Hot-Weather Rules and Noon-Feeding Rules. Copies of any of these Rules will gladly be sent free on request to any horseshoer who writes to the secretary, Mr. Lewis A. Armistead, at the above address.

Protect your animals from the cold. This will make them more comfortable, and will save you feed.

Stop the holes in your barn.

Board in your tie-up.

An old horse, especially, like an old man, feels the cold.

Blanket your horses on frosty nights in the Fall, when their coats are short.

Give your horses and cattle a good bed. Bedding is cheap.

Water your horses at least three times a day. The stomach of the horse is very small.

Punctuality in feeding and watering the stock is very important. They will worry and lose flesh if kept waiting beyond the regular time.

A good grooming costs no money, and is equal to two quarts of oats.

A horse cannot thrive on hay alone. He needs oats or corn for strength; and grass, bran or potatoes to keep his bowels right.

Keep your horse's feet soft and have him shod often. More feet are ruined in the stable than on the road.

Do not degrade your family by using a lame horse.

Kill the worn-out or incurably lame horse. If you sell him, the money that you receive is blood money.

The New Auto-Horse

The latest development in the evolution of the horse from the small, terrier-like creature of ages past, is exemplified in this "auto-horse," another of the many remarkable products of American ingenuity. Its field of usefulness seems to be quite as unlimited in the sphere of the horse as that of the noble beast himself, yet it appears to possess advantages undreamed of in old Dobbin. It can be used for both team-hauling and motor-trucking and is said to be considerably more economical than either, besides being far more adaptable to the various conditions of service usually performed by either the horse or the automobile.

Like the horse, it pulls its load, thereby multiplying its power many times, which is contrary to the principle of operation employed in the motor-truck which carries the load and pushes it from the rear wheels.

It can be quickly attached to a farm wagon or ordinary truck and the "hitchin'-up" process is done in the twinkling of an eye. It has a remarkable turning radius of 360 degrees without moving the load, which makes it ideally fitted for maneuvering in tight places.

All told, this ingenious tractor represents a distinct advancement for the better in the field of transportation. It will never wholly replace the horse, but will relieve man's faithful friend of many of his hardest burdens. And for the black-

The Smith in The Daily News

Odd Mention of Anvil Ringers and Knights of the Forge in the News of the Day

Army Needs Blacksmiths

The Railway Construction Regiment of the army, now being formed by the War Department, wants 150 men from the ranks of blacksmiths who are willing to fight the Germans with sledges and anvils. The men will be rated as first class privates and will receive \$33 a month and expenses.

Government places big contract with Blacksmith for Shark Hooks

J. W. Fordham, a blacksmith of New London, Connecticut, has just signed a contract to furnish 1,000 shark hooks to the U. S. government, 300 of which are to be ready within ten days, and the remaining 700 to be ready within twenty days after the first shipment.

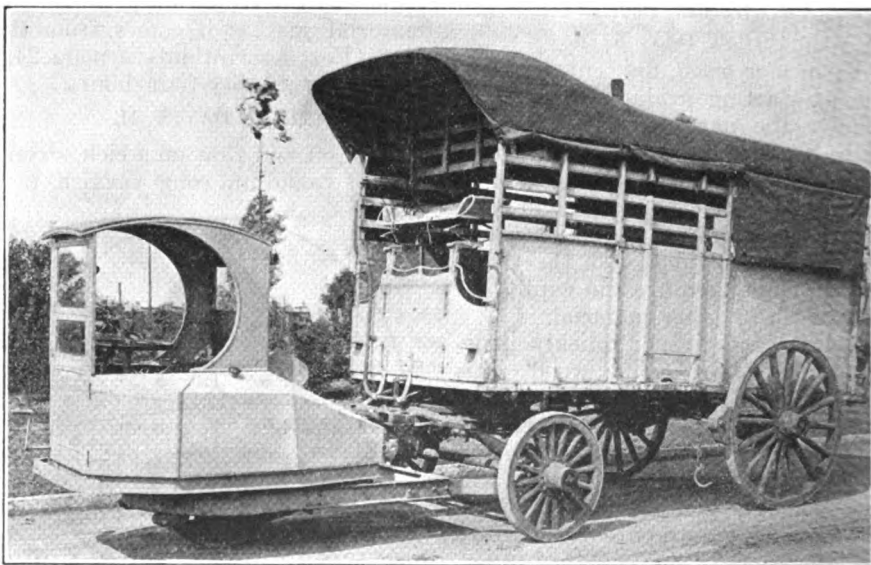
The hooks are to be in three different sizes, namely, the 7-16 hook, which is eleven inches long; the 3-8 hook, which is ten inches long, and the 1-4 hook which is nine inches long.

Each hook has a chain of about twelve inches attached to it, at the end of which is a small swivel. This swivel allows the chain to turn in any direction without causing the line to be twisted.

Owing to the scarcity of leather, the government is making an attempt to use the hide of the shark, hence the sudden demand for hooks.

Coming of Automobile Leaves Ample Field for Horse-drawn Vehicles

"The horse has not been displaced by the automobile," said G. W. Huston, of the



THE LATEST STEP IN THE EVOLUTION OF THE HORSE

smith it will mean many new opportunities which will come about co-incident with the growth in the popular use of tractors of this type.

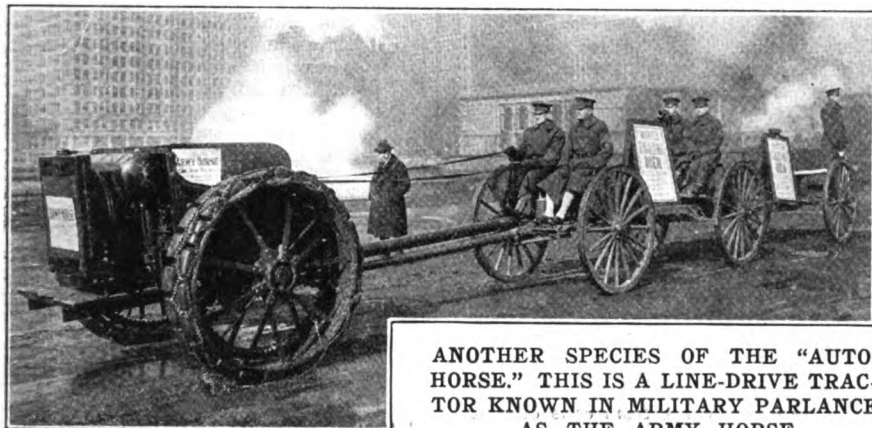
Carriage Builders' National Association, at its recent annual convention. "There are many roads in the country that are impracticable for motor travel during many months of the year, and there the

good old steady horse is called upon as much as he used to be."

A visit to the exhibition rooms of this convention certainly attested the truth of his statements, for there were booths showing the manufacture of every conceivable variety of carriage and wagon goods, carriage hardware, carriage leather goods, etc.

Girls Qualify as Blacksmiths' Helpers

"Miss Susie Smith, blacksmith's helper!" Sounds like the days of the Amazons,



ANOTHER SPECIES OF THE "AUTO-HORSE." THIS IS A LINE-DRIVE TRACTOR KNOWN IN MILITARY PARLANCHE AS THE ARMY HORSE

but it's merely the commonplace twentieth century in the Puget Sound navy yard.

Women are now being listed at the navy yard with the rating of "blacksmith's helper," "machinist's helper," "general helper," etc., titles that formerly were borne only by men under civil service rules.

The rating of helper in various trades is given to women who are assigned to the various shops as timekeepers, stenographers and clerks. These places, formerly held by men, are now exclusively occupied by women.

"The navy yard has become 'cussless,'" commented one of the masculine employees. "When we want to swear now we write it down on a piece of paper and throw it in the waste basket."

Uncle Sam Needs "Handy Men" in the Flying Corps

The War Department has plenty of fliers, but it lacks men to stay on the ground.

"Enlist in the aviation section, but don't go up in the air," is a literal translation of the call from Washington for these recruits.

An aviation corps may have ever so many birdmen, but it is helpless without an even larger personnel that never leaves the ground. There is a special opportunity to a very great number of men now to serve their country with the unit of America's fighting forces, which all the authorities agree will play a conspicuous part in the ending of the war.

This service, while it will not put men in the front line trenches, will undoubtedly place them behind the lines in France before many months have passed.

Men between the ages of 18 and 40 are needed and the Aero Battalions will comprise blacksmiths, chauffeurs, metal workers, magneto repairmen, motor experts, motorcycle repairmen, vulcanizers, welders, and other skilled mechanics.

After enlistment and when subject to assignment, all applicants accepted for

aviation service will be sent to Fort Sam Houston, Texas, for duty with aero squadrons being formed in the Southern Department.

All applicants are enlisted as privates, but such may soon advance as corporals and sergeants when found qualified. Married applicants whose wives or families are not dependent on them for support, can volunteer. Applicants must pass the same physical examination as other recruits. A technical worker in any of the

ters were broken by the impact of his body. A wife and one child and his parents survive.

High School Boys Learn Something About Smithing and the Price of Coal

In charge of Prof. W. J. Hanson and Mr. Brandenburger, one of the elementary science classes of Belleville (Ill.) High School, instituted the practical and worthwhile scheme of giving the students first-hand instruction in blacksmithing by visiting the Wm. Harszy blacksmith shop. The class made the visit in order to get an idea of the practical methods of a smith's work in connection with manual training and science work.

The proprietor of the shop spoke to the class in an interesting manner on his work and the kinds of material used. The coal used in the forge was one of the topics of discussion and brought out the fact that the smith was paying \$12 a ton for Piedmont coal, the kind used, and that the raise in price was due to the fact that this fuel is used to produce smoke screens for the American fleets.

Trades Taught to Men in Navy

It has been said time and time again that the navy offers great opportunities for young men to make a good start in life and there is no better time for the young smith, who is anxious to learn his trade and to help his country than now, and no better place to accomplish this than in the navy.

Uncle Sam is anxious to lend a helping hand to the young men in his employ and give them a boost toward better things in his service and toward a higher place in civil life. With this in view the navy department maintains schools in more than a dozen trades which are open to men who enlist for service on the warships. The schools not only serve as a medium for a sailor to advance himself in the navy, but equip him to earn a good wage should he return to civil life.

For the blacksmith class a candidate must have had experience, at least, in that line of work. He is taught welding in the different ways, "jumping on" pieces, working angle iron, making shackles, chains, bolts, rivets, mast bands, eye bolts, pall eyes, iron work for blocks and all the fittings likely to be required on board ship which would have to be made with a forge. Blacksmiths are also given special instruction in the shackling and unshackling of chain.

Birth of the Linen Collar

The wife of a Troy (N. Y.) blacksmith is credited with the invention of modern man's greatest affliction—the stiff collar. This happened in 1825, and men have been suffering ever since. Outside of inventing the separate collar, this woman did the family washing.

Accordingly she set herself to work making separate collars for her husband's shirts and then made enough to sell outside the home. This innovation attracted the attention of Rev. Ebenezer Brown, a retired Methodist minister, and he, with the aid of the women of his family, went about selling collars. This was in 1829.

All the work on these early collars was done by hand, for the sewing machine had not yet been invented. In those days not more than a dozen collars a day were sold. Their name—"string collars" was specially appropriate, for they were tied around the neck with a string of tape attached to each end of the collar.

mechanical industries will find in the above field of enlistment a rare opportunity. If called by the local examining board no man can volunteer. Enlistment is for the period of the war only. Aliens not subjects of enemy countries are eligible to enlist without declaration of intention to become citizens. Ability to speak English is the only educational qualification.

Blacksmith Does His Bit by Knitting Socks and Belts for Soldier Boys

Arthur Waghorn, a brawn-armed blacksmith, residing at East St. Louis, Mo., is doing his bit for Uncle Sam.

Each evening after supper Waghorn, who is employed at the plant of the Elliot Frog & Switch Works, gets out his knitting-set and knits and knits and knits. Within the last few weeks he has knitted several pairs of heavy socks and woolen belts for American soldiers, and has turned them over to the Red Cross.

Waghorn first learned how to knit when he was in the British Army during the Boer war. He knows how much a soldier enjoys warm, comfortable socks.

He has taught Mrs. Waghorn how to knit and they spend most of their evenings at home, just knitting, knitting, knitting.

Gas Explosion Kills Blacksmith

Ira Frazier, a blacksmith in the employ of the Union Tank Line Company in their car repair shop in the works of the Standard Oil Co., at Neodesha, Kan., was instantly killed when he attempted to enter the dome of a tank car with a hot rivet. Frank Wilson, the foreman of the shop, suffered nervous prostration as a result of the accident which he had witnessed and which he deemed himself to be responsible for. It is not known whether or not the car had been steamed, but at any rate, some gas remained in it and when the hot rivet came in contact with the fumes, it ignited and the explosion followed, hurling Frazier through the roof. His clothes were completely torn off and his body badly burned. He was hurled with such force that two eight-inch raf-



When You Know a Fellow

When you get to know a fellow, know his joys and know his cares.

When you've come to understand him and the burdens that he bears.

When you've learned the fight he's making and the troubles in his way,

Then you find he is different than you thought him yesterday.

You find his faults are trivial and there's not so much to blame

In the brother that you jeered at when you only knew his name.

You are quick to see the blemish in the distant neighbor's style,

You can point to all his errors and may sneer at him the while,

And your prejudices fatten and your hates more violent grow

As you talk about the failures of the man you do not know.

But when drawn a little closer and your hands and shoulders touch

You find the traits you hated really don't amount to much.

When next you start in sneering and your phrases turn to blame,

Know more of him you censure than his business and his name:

For it's likely that acquaintance would your prejudice dispel,

And you'd really come to like him if you knew him very well.

When you get to know a fellow and you understand his ways,

Then his faults won't really matter, for you'll find a lot to praise.

—Detroit Free Press.



Heats, Sparks, Welds

Contributed to the Red Cross Fund yet? Remember—it's money that makes the War go.

And you can also help by purchasing War-Savings Stamps. They are cheap, convenient, easy to buy, and, a *real investment*.

Take care of the Flag and the War will take care of itself.

Uncle Eb sagely remarks: "Not many fellers hev sprained their wrists tryin' t' turn over a noo leaf!"

But, anybody can turn over a new leaf—it takes backbone to keep it down.

Maybe old Dobbin hasn't as many parts as an auto, but he is largely automatic, and say—don't he make the best sparking plug ever?

Speaking of competition, maybe you

are not your brother's keeper—but how about being his friend?

Ol' Farmer Wiseboy says, sez he: "If the feller who's allus complainin' of the man who's holding him down wants t' find thet man, he'd better consult a good, reliable mirror."

Spare moments are the most valuable things you have. What are you doing with yours?

Ever stop to think what a fine time the Editor must have trying to please *all* of his readers?—about as easy as a bride has in trying to please all of her husband's relatives.

There's some that believe in the almanac; some go on what the Weather man says; and others just don't care a rap about either but keep a-hammerin' away, rain or shine, all year long.

Which brings to mind Robert Louis Stevenson's cheerful outlook on life: "When we look into the long avenue of the future and see the good there is for each one of us, we realize after all what a beautiful thing it is to work, and live, and be happy."

And that's something we had all better think over, now that the New Year is upon us.

Profit comes out of the box *last*. If you buy a case of anything from cans of axle grease to wagon wrenches, *your profits* come out of the last three or four sold. Every item sold before that simply gives you your money back and until you get rid of the last few, you are profitless.

Why the difference? — when a man wears good clothes at work his pay is a "salary"; when he decorates his person with overalls it is "wages."

It's funny how folks prate on the value of an education. Maybe so, but we'll bet a ticket to the next County Fair that it's big-head that keeps more men from succeeding than lack of education was ever accused of.

It is doing things that really count in this world. You may perhaps have the very best of intentions but if they are not made manifest in deeds, what do they amount to?

How about that letter you were going to send in to the Editor telling us about your shop, business and prices, etc., in your section?—and that shop kink of yours that you were going to send in? It will not benefit brother craftsmen as long as it's milling around under your hat.

It's good advice to buy just what fits your needs, not what you can get cheapest.

Blacksmiths, of all men, should know the value of good temper. Yet how many of us know how to temper our lives as we should? Temper and temperance—apply the latter to yours. You will find a distinct business asset in keeping your temper—to say nothing of its health value. A disordered temper not only breeds disordered business but a disordered body as well.

Being patriotic is like making love to a widow—you simply can't overdo it!

Advertise—stir yourself for more business. It's yours if you will get out and go after it! It isn't the bee that hangs around the hive that gathers the honey—it's the one who goes out and hustles.

The only thing green about the farmer in these enlightened times is the cash he carries.

If he owes you anything, better hustle now and collect it!

Proverbs of Solumn

WHAT profiteth a smith if he gaineth all the work in his community and goeth broke in doing it?

Blessed is the smith who calleth his competitor brother His feet shall walk in the paths of peace, and contentment and prosperity shall abide in his shop.

Woe unto the smith who doeth a bum piece of work and concealeth it with paint. The paint shall fall off, and so shall his business.

The wise smith maketh satisfied customers.

—Will Bishop.

Look out, folks, we don't want you to lose any money. The oily tongue of the sharper and the faker are always abroad in the land and when one of 'em solicits your subscription to "Our Journal," insist on seeing his letter of authority. Every man soliciting subscriptions for THE AMERICAN BLACKSMITH is supplied with a letter which gives him the right to receive subscriptions and this letter is current for *three months only*. After that it must be renewed. So if a solicitor has no letter to show you, or, if his letter has expired, better tell him: "I will send in my order direct." Please bear these points in mind, we don't want your good money to go towards the support of these smooth-tongued sharps.

To remove grease stains from blue-prints, papers, etc., place sheets of blotting paper over and under the stained sheet, to protect the others. Lay powdered magnesia on the stain and under it; then press over the blotting paper with a hot iron. When the powder is shaken off, the stain is gone.

How Longfellow Came to Write Poem

Not many are aware of how Longfellow came to write his famous "Village Blacksmith." It is related in St. Nicholas as follows:

"The professor came to be a neighbor of the blacksmith in the year 1837. As he walked daily past the smithy and the simple comfortable home of the blacksmith he came to watch and know the kindly man. It was not long before they became good friends. The blacksmith was proud of his home and doubtless told the professor how happy he was when in 1825 he had made his first arrangements to buy it from a man named Torrey Hancock. And perhaps sometimes they talked about the wonderful spring that was famous for its clear and sparkling waters for this was right at hand. Below the spot where the spring gushed forth the women of the town still did their washing.

"The name of the street where lived the blacksmith and the professor is the same today as in their time. If you visit the great city of Cambridge, you will easily find your way to Brattle street and the homes of "The Village Blacksmith," by name Dexter Pratt, and of the professor and poet, Henry W. Longfellow."

Don't forget—there's another Liberty Loan coming again soon. Better be saving your money. Begin now, with the New Year.



Our Honor Roll

A RESOLUTION.

This time of the year seems to be the accepted time for the preparation of resolutions for adoption at New Year's. The following resolution is accordingly suggested:

Resolved: That I will send in my order now for a long-period subscription to The American Blacksmith.

For—Be It Known that by so doing—I will—1st, Save Money—2nd, Save Time and Annoyance—3rd, Insure My Subscription and 4th, Help Reduce the High Cost of Living.

To This Resolution and for these reasons I willingly subscribe; setting down my hand and seal this January, 1918.

Let us know where you stand on this resolution. We want every reader of "Our Journal" to get the full advantage of Our Long-Time Rates. Why shouldn't you subscribe at the lowest rate you can possibly get? The money-saving you make is very considerable: why not put that money into your own pocket?

U. S. and Mexico

Canada

Other Countries.

2 yrs.....	\$1.60 and save \$.40.....	\$2.00 and save \$.50.....	10 sh. save 2 sh.
3 yrs.....	2.00 and save 1.00.....	2.70 and save 1.05.....	14 sh. save 4 sh.
4 yrs.....	2.50 and save 1.50.....	3.20 and save 1.80.....	18 sh. save 6 sh.
5 yrs.....	3.00 and save 2.00.....	3.75 and save 2.50.....	1 £ save 10 sh.
10 yrs.....	5.00 and save 5.00.....	7.00 and save 5.50.....	1 £ 14 sh. save 1 £ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no better time than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
H. E. Pass, Minn.	Dec., 1917	E. L. Lain, N. Y.	Dec., 1925
E. A. Krehbiel, Kans.	May, 1937	J. A. Hulvey, Illinois	Dec., 1925
The Fix-It Shop, Utah	July, 1935	Williams & Turner, W. Va.	Dec., 1925
J. A. Torrey, Mass.	Dec., 1933	J. J. Devine, N. J.	Dec., 1925
C. W. Watt, Kansas	Dec., 1930	P. Nelson, Minn.	Dec., 1925
C. J. Vanblad, Pa.	Mar., 1929	M. Kennedy, Tas., Australia	Dec., 1925
I. J. Stites, N. Y.	Jan., 1929	H. Jones, England	Dec., 1925
A. J. Brookman & Co., Aust.	Sept., 1928	A. J. Wassmuts, Idaho	Nov., 1925
Waddington Farm, W. Va.	Mar., 1928	J. G. H. Mallett, Queens, Australia	Nov., 1925
A. MacLean, Ont., Can.	Feb., 1928	A. W. Speir, Ohio	Nov., 1925
C. Forrest, Cal.	Dec., 1927	W. R. Clepper, Texas	Nov., 1925
S. Frey, Ind.	Dec., 1927	G. H. Ialey, Mass.	Nov., 1925
E. Lewis, Iowa	Dec., 1927	L. Krause, Ind.	Oct., 1925
Plateau Shoeing Shop, Colo.	Dec., 1927	Reynolds Brothers, Pa.	Sept., 1925
J. Forschel, Tenn.	Dec., 1927	F. W. Krenz, Calif.	Aug., 1925
H. Facklam, Wisc.	Nov., 1927	C. E. Allen, Nebr.	Aug., 1925
A. A. Wilson, N. Z.	Sept., 1927	Halvorson Bros, S. D.	May, 1925
F. C. Bock, Nebr.	June, 1927	A. E. Spangberg, Oregon	May, 1925
W. W. Egly, Pa.	June, 1927	D. M. Kille, Okla.	Apr., 1925
C. Stebbins, Jr., Kansas	May, 1927	G. Gullgren, Iowa	Apr., 1925
J. Brennenman, Va.	May, 1927	G. Fredericks, Minn.	Mar., 1925
S. Forman, N. J.	Apr., 1927	V. Priessnitz, Wisc.	Mar., 1925
H. Dyreson, S. D.	Apr., 1927	E. Price, Illinois	Feb., 1925
G. Shoemaker, Pa.	Mar., 1927	D. C. Garber, Ohio	Feb., 1925
C. Geiger, Penn.	Mar., 1927	J. H. Kurt, Illinois	Feb., 1925
F. Evans, Conn.	Mar., 1927	E. R. Hiteshue, Ohio	Feb., 1925
P. Flanagan, Cal.	Mar., 1927	H. F. Schreiber, Pa.	Feb., 1925
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A. Tillman, Calif.	Feb., 1927	J. M. Withers, Hawaii	Jan., 1925
J. W. Haight, Ill.	Feb., 1927	W. Herdt, Ky.	Dec., 1924
F. Roschy, Pa.	Feb., 1927	D. Teebien, Nebr.	Dec., 1924
J. W. Howes, Md.	Feb., 1927	N. B. Quick, Pa.	Dec., 1924
W. Stocker, Texas	Feb., 1927	F. H. Jarvis, Indiana	Dec., 1924
W. Pontius, Iowa	Feb., 1927	George Tatum, Jr., Fla.	Dec., 1924
M. Goller, Pa.	Feb., 1927	I. Clark, Va.	Dec., 1924
A. A. MacLean, Nev.	Feb., 1927	A. N. Estes, Va.	Dec., 1924
C. M. Adams, Conn.	Jan., 1927	J. Bailey, Manitoba	Dec., 1924
C. Radeleff, Ill.	Jan., 1927	E. G. Naylor, Md.	Dec., 1924
P. J. Kauth, Iowa	Dec., 1926	P. Schicksa, Washington	Nov., 1924
A. H. Gooding, S. Aust.	Dec., 1926	H. E. Snyder, Oregon	Nov., 1924
A. Granadan, Ill.	Dec., 1926	J. A. Stewart, Ky.	Oct., 1924
C. J. Hale, Wash.	Dec., 1926	C. Richebeck, N. Y.	Oct., 1924
John H. Schneider, Cal.	Dec., 1926	W. L. Berthoff, N. J.	Oct., 1924
J. C. Smith, Washington	Dec., 1926	J. W. Hewson, S. Africa	Sept., 1924
H. Grimm, Utah	Dec., 1926	Ed. Larson, N. D.	Sept., 1924
F. Harding, Iowa	Dec., 1926	R. T. Monk, Illinois	Sept., 1924
F. L. Matlocks, Ark.	Sept., 1926	W. T. De Young, Illinois	Sept., 1924
E. B. Jones, Wisc.	Sept., 1926	C. W. Taylor, Pa.	Aug., 1924
J. Taylor, Calif.	Oct., 1926	Charles Wells, Colorado	Aug., 1924
W. H. Branch, N. C.	Oct., 1926	H. G. Weaver, Pa.	Aug., 1924
J. Clarke, Jr., Queens, Aust.	Aug., 1926	Working Men's College, Vict.	June, 1924
I. Boles, Ohio	July, 1926	F. M. Kenoyer, Nebr.	June, 1924
J. A. Buchner, Mich.	July, 1926	O. Anderson, Ariz.	May, 1924
H. Mitchell, N. Y.	July, 1926	R. C. Frederick, N. D.	May, 1924
M. Broton, N. D.	June, 1926	H. L. Panton, New Mexico	May, 1924
A. Schmitt, Nebr.	June, 1926	J. Carl, Iowa	May, 1924
D. Ackland & Son, Man.	May, 1926	J. E. Little, Pa.	May, 1924
H. Pirret, Ore.	May, 1926	H. I. Brenzie, N. Y.	Apr., 1924
J. Sinclair, W. Australia	May, 1926	W. E. Parr, Iowa	Apr., 1924
P. Siewa, Oregon	May, 1926	F. Sramek, Nebr.	Apr., 1924
E. P. Digman, S. Australia	Apr., 1926	L. A. Hulien, Calif.	Apr., 1924
P. A. Peterson, Iowa	Apr., 1926	J. Sparks, Va.	Mar., 1924
G. F. Bowers, Okla.	Apr., 1926	J. E. Ray, Minn.	Mar., 1924
W. Foehelu, Oregon	Mar., 1926	A. Hulstrand, N. D.	Mar., 1924
A. Garver, Ohio	Feb., 1926	W. F. Selbert, Calif.	Mar., 1924
C. Burton, Mass.	Mar., 1926	P. F. Selbert, Calif.	Mar., 1924
J. Murphy, Calif.	Jan., 1926	H. Roeschwetter, Mo.	Mar., 1924
J. P. Murphy, Nev.	Jan., 1926	W. B. Briant, N. J.	Mar., 1924
F. Kearnes, Illinois	Jan., 1926	A. Bosch, N. Y.	Mar., 1924
J. N. McIntire, Pa.	Jan., 1926	D. Van Valkenburg, Mass.	Feb., 1924
W. Post, N. Y.	Jan., 1926	A. B. Johnson, R. I.	Feb., 1924
Powell Brothers & Whitaker, Eng-land	Jan., 1926	F. Jacobs, Ohio	Feb., 1924
O. Temple, Idaho	Jan., 1926	A. J. Ferry, Illinois	Jan., 1924
N. Karolowicz, S. Dak.	Jan., 1926		

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E. K. Walker, Calif.	Jan., 1924
H. D. Erskine, Vermont	Jan., 1924
E. Fowler, Pa.	Jan., 1924
Breen & Son, Ireland	Dec., 1923
M. Lamoreaux, Ohio	Dec., 1923
C. R. Davis, N. Y.	Dec., 1923
F. W. Copeland, Kansas	Dec., 1923
J. L. Tomlin, Kansas	Dec., 1923
H. A. Davis, N. Y.	Dec., 1923
E. H. Troyke, Illinois	Dec., 1923
D. B. Johnson, Iowa	Dec., 1923
J. M. Karer, Ohio	Feb., 1923
S. Horton, Calif.	Nov., 1923
J. Spratt, Mass.	Nov., 1923
F. Watkins, N. H.	Nov., 1923
F. Koppnis, Ala.	Nov., 1923
Y. C. Lienert, S. Australia	Oct., 1923
W. B. Abell, N. Y.	Oct., 1923
A. J. Brookman & Co., Vict. Australia	Sept., 1923
W. R. Turner, Man.	Oct., 1923
C. Nelson, Nebr.	Sept., 1923
J. Hughes, Ohio	Aug., 1923
H. M. Anderfuren, Calif.	Aug., 1923
Camp Brothers, Texas	Aug., 1923
L. C. Larson, Iowa	July, 1923
S. Effenar, South Africa	July, 1923
G. L. DeWitt, Mont.	July, 1923
W. W. Gregg, Texas	July, 1923
W. R. Stroupe, N. C.	July, 1923
O. C. Young, Michigan	June, 1923
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A. Chapman, N. Y.	June, 1923
C. Birely, Md.	June, 1923
F. H. Shupe, Pa.	June, 1923
J. C. Stover, Pa.	Apr., 1923
W. Schoonover, Pa.	Apr., 1923
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Landsdale Brothers, Mo.	Mar., 1923
J. Carswell, Ark.	Mar., 1923
G. E. Glazier, Ohio	Mar., 1923
F. Gath & Co., S. Africa	Mar., 1923
T. Bradley, N. S. Wales	Mar., 1923
L. T. Needham, Illinois	Feb., 1923
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V. G. Wise, Calif.	Jan., 1923
F. S. Bishop, South Africa	Jan., 1923
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C. King, Wisc.	Jan., 1923
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A. Jones, Nebr.	Dec., 1922
W. Etter, Mo.	Dec., 1922
M. Hewston, Idaho	Nov., 1922
E. H. Hoese, Texas	Nov., 1922
T. Ziegler, Wisc.	Nov., 1922
J. Gold, Alta., Can.	Nov., 1922
B. A. Steink, Ohio	Nov., 1922
Shepard & Son, N. Y.	Nov., 1922
P. Fredericks, Iowa	Nov., 1922
L. O. Leurs, Illinois	Nov., 1922
W. Lawson, New Zealand	Nov., 1922
S. Shields, Kans.	Oct., 1922
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W. H. Miller, Iowa	Oct., 1922
I. Sproul, Me.	Sept., 1922
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A. D. Standford, Washington	Sept., 1922
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A. Peliffer, Ohio	Aug., 1922
W. D. Valentine, Iowa	Aug., 1922
H. Deverson, N. Z.	July, 1922
T. Cull, Ky.	July, 1922
G. Hoffman, N. Y.	July, 1922
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G. Cottrell, Minn.	June, 1922
W. R. Gelling, Australia	June, 1922
W. K. W. Hansen, Pa.	June, 1922
Robert Tochter, Calif.	June, 1922
J. Van Marter, N. Y.	June, 1922
J. T. Braham, Iowa	June, 1922
A. Olson, Minnesota	June, 1922
Otis Alman, Mich.	June, 1922
E. Schnelle, Ohio	Apr., 1922
J. Bunker, Iowa	Jan., 1922
F. Norrie, Yukon Ty.	Jan., 1922
J. Needham, Kans.	May, 1922
E. Anders & Son, S. Aust.	May, 1922
Louisa Carriage Works, Va.	May, 1922
S. Wilkin & Sons, N. Y.	Apr., 1922
R. H. Kuhns, Iowa	Apr., 1922
S. Smith, Texas	Apr., 1922
E. Burrows, Eng.	Apr., 1922
A. J. Neill, Vt.	Mar., 1922
W. Muckle, Ontario	Mar., 1922
M. Burke, Ariz.	Mar., 1922
J. W. Hodge, N. Y.	Mar., 1922
J. W. Hnar, La.	Mar., 1922
D. W. Smith, Rhode Island	Mar., 1922
E. A. Dillon, Nev.	Mar., 1922
D. F. Kuster, Washington	Mar., 1922
C. A. Whitaker, Ohio	Mar., 1922
J. Postgen & Co., Missouri	Mar., 1922
W. T. Long, Colo.	Feb., 1922
C. Robertson, S. Africa	Feb., 1922
J. Savodink, Kans.	Feb., 1922

NAME	Subscription Paid to
P. C. Oldroyd, Utah	Feb., 1922
V. Vanouret, Wisc.	Feb., 1922
W. Parker, Mich.	Feb., 1922
J. DeGlopper, Mich.	Feb., 1922
Nordstrom Bros., Kans.	Feb., 1922
G. F. Johnson, Michigan	Feb., 1922
J. Schoenberger, Ohio	Jan., 1922
A. Burgett, Pa.	Jan., 1922
R. H. Keith, Iowa	Jan., 1922
W. Parks, Ohio	Jan., 1922
O. Danneman, Minn.	Jan., 1922
O. Stenning, S. D.	Jan., 1922
W. Claffey, Illinois	Jan., 1922
J. Wedwick, N. D.	Dec., 1921
J. Williams, Australia	Dec., 1921
C. Beggs, Alaska	Dec., 1921
J. J. Kilma, Nebr.	Dec., 1921
J. Boyer, Mich.	Dec., 1921
C. F. Shaw, Man., Can.	Dec., 1921
W. Bisker, Ohio	Dec., 1921
W. Lamberton, N. Y.	Dec., 1921
Scheffley & Schmitt, Pa.	Dec., 1921
O. Furry, Kans.	Dec., 1921
E. A. Pierson, Okla.	Dec., 1921
J. Robertson, Scot.	Dec., 1921
J. Lauer, Mo.	Dec., 1921
A. Brause, Ohio	Dec., 1921
B. A. Abhey, Ohio	Dec., 1921
J. Ingurson, Minn.	Dec., 1921
A. F. Millebrandt, Mich.	Dec., 1921
F. H. Teufel, Jr., Illinois	Dec., 1921
R. C. Brown, Mo.	Dec., 1921
C. Beyer, N. D.	Dec., 1921
G. Nichols, Okla.	Dec., 1921
F. H. Joslin, Mass.	Dec., 1921
J. B. Scheldier, Indiana	Dec., 1921
J. H. Ickes, Pa.	Dec., 1921
E. Willis, Colorado	Dec., 1921
J. W. Gorton, Ark.	Nov., 1921
A. Elliott, England	Nov., 1921
J. Beam, N. J.	Nov., 1921
F. Kolarik, Iowa	Nov., 1921
A. McNab, Scotland	Nov., 1921
J. Delane, Nebr.	Nov., 1921
A. Marks, N. S. W. Aust.	Nov., 1921
O. R. Stevenson, Ill.	Nov., 1921
J. Meier, Minn.	Nov., 1921
H. Schroeder, Mich.	Nov., 1921
G. Boozee, La.	Oct., 1921
J. O. Altkin, Aust.	Oct., 1921
W. Knouff, Ala.	Oct., 1921
O. M. Johnson, Miss.	Oct., 1921
J. K. Glinicki, Mich.	Sept., 1921
H. Feldus, Nebr.	Sept., 1921
R. Murray, Calif.	Sept., 1921
A. Hammond, Calif.	Sept., 1921
P. Wedel, Kans.	Sept., 1921
J. Ackerman, Indiana	Sept., 1921
A. Harper, Mont.	Aug., 1921
L. E. Bonton	July, 1921
C. Pearce, Australia	July, 1921
J. Watson, S. Africa	July, 1921
R. Goldschagg, S. Africa	July, 1921
C. Hammerstram, Minn.	July, 1921
A. S. Pratt, New York	July, 1921
E. H. Spain, Ariz.	July, 1921
L. H. Strange, Vict., Aust.	July, 1921
T. Watson, Aust.	June, 1921
W. Urquhart, New Zealand	June, 1921
W. Voigt, S. Africa	June, 1921
J. M. Werl, Pa.	June, 1921
E. Toll, New Zealand	June, 1921
J. Devers, Ohio	June, 1921
W. K. Bell, Ark.	May, 1921
A. Quettler, Texas	May, 1921
G. Johnson, Kans.	May, 1921
S. Eudda, New Guinea	May, 1921
H. Baker, Australia	May, 1921
F. E. Smith, Vermont	May, 1921
A. J. Hatch, Maine	May, 1921
W. Cornwell, Pa.	May, 1921
W. F. Kline, Kansas	May, 1921
J. Kirkbride, N. J.	May, 1921
Thos. McNeill, Scotland	May, 1921
T. Holloway, Kans.	Apr., 1921
W. Winget, Vt.	Apr., 1921
J. A. Johnson, N. D.	Apr., 1921
D. H. Laird, N. Y.	Apr., 1921
A. J. Prue, N. Y.	Apr., 1921
C. A. Butler, Ohio	Apr., 1921
E. Mosner, Queens, Australia	Apr., 1921
J. Laux, Oklahoma	Apr., 1921
C. L. Cease, Pa.	Mar., 1921
E. Lindblad, Nebr.	Mar., 1921
F. Bowen, N. Y.	Mar., 1921
W. F. Tippey, Mich.	Mar., 1921
J. T. Rehm & Son, N. Y.	Mar., 1921
W. C. LeBow, Mo.	Mar., 1921
William Pate, Mo.	Mar., 1921
A. T. Jameson, Colorado	Mar., 1921
C. Alexander, N. Y.	Mar., 1921
J. Fencil, Wisc.	Mar., 1921
H. Cornils, Oregon	Mar., 1921
C. Schmidt, Nebr.	Mar., 1921
J. Schwarsmann, D. C.	Mar., 1921
M. Stettner, Minn.	Mar., 1921
Elmer Wetzel, N. J.	Feb., 1921
J. Potthoff, Nebr.	Feb., 1921
N. E. Hart, Okla.	Feb., 1921
C. Knudson, Iowa	Feb., 1921
S. Button, Kans.	Feb., 1921
N. F. Hartree, Mo.	Feb., 1921
I. Goeprle, N. C.	Feb., 1921
E. Pratt, Ill.	Jan., 1921



The Army Horseshoer.

Anatomy and Physiology of the Horse's Foot

26. By *anatomy* of the foot is meant a description of the various parts entering into its formation; and by *physiology* is meant the functions or uses of these parts.

27. The horse's foot is composed of four parts: (1) The bones; (2) certain elastic structures of cartilage (gristle) and fat; (3) the layer of highly sensitive flesh (quick) which covers this bony framework; (4) the box, or case of horn, called the hoof, which incloses and protects the sensitive parts.

Bones of the Pastern and Foot

28. The bones of the pastern region and foot form a column extending downward from the fetlock into the hoof, and are named as follows: The long pastern bone (*Ossuf-fraginis*), the short pastern bone (*Os coronae*), the coffin bone (*Os pedis*), the navicular or shuttle bone (*Os navicularis*). See Plate IV.

The *long pastern bone* reaches from the fetlock joint above to the pastern joint below. Its upper surface has a shallow cavity on each side, separated in the middle by a deep groove, and into this surface fits the lower end of the cannon bone, forming the fetlock joint. The lower surface is much smaller and narrower than the upper. On each side is a small ridge, the two ridges separated in the middle by a shallow groove to fit the upper surface of the short pastern bone, forming the pastern joint.

The *short pastern bone* follows the direction of the long pastern bone downward and forward, and lies between the pastern and coffin joint, its lower end being within the hoof.

Its upper surface has a shallow cavity on each side, with a ridge between them to fit the lower end of the long pastern bone.

The lower surface of this bone has a ridge on each side, the two ridges separated by a groove to fit the upper surface of the coffin bone in the coffin joint.

The *coffin bone* is of irregular

shape; it is situated within the hoof and is similar to the latter in outline and form.

The front surface is known as the *wall surface*; it shows a number of small openings for the passage of blood vessels and nerves, and is roughened to give attachment to the soft parts (sensitive laminae) covering it. At the top of this surface, in front, is a ridge called the *peak* (pyramidal process), to which is attached the extensor tendon of the foot.

The lower surface, called the *sole surface*, is half-moon shaped, dished and smooth, and is covered by the sensitive sole. The upper surface helps to form the coffin joint, and is called the *joint surface*; it has two shallow cavities, separated by a ridge to fit the lower surface of the short pastern bone.

Just back of the joint surface is a small groove to fit the navicular bone which lies behind.

Just back of the sole is a rough surface, to which is attached the flexor tendon of the foot; it is called the *tendinous surface*.

On each side of this surface is a groove running forward to an opening; an artery and a nerve enter the bone, and a vein leaves it through this opening.

On each side, the coffin bone extends backward, forming what is called the *wing*. Each wing has a notch and a groove, the latter running forward on the outside of the bone; an artery lies in the notch and groove.

The navicular bone is of irregular shape, situated behind and below the short pastern bone and behind the coffin bone, forming a joint with both. The extremities of the bone are attached to the wings of the coffin bone; the lower surface is covered with cartilage, which forms a smooth surface for the movement of the flexor tendon, which bends the

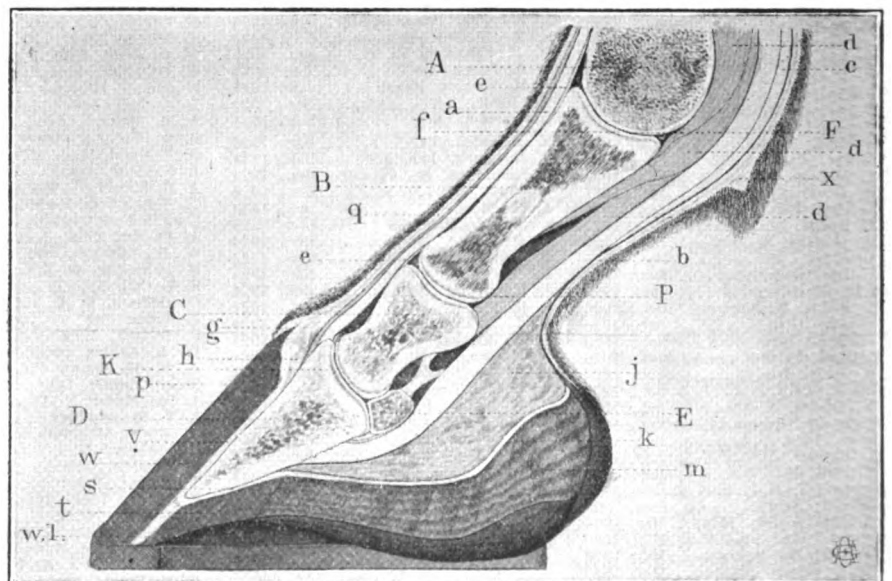


PLATE IV—PARTS OF THE HOOF AND PASTER

A. Cannon bone.
B. Long pastern.
C. Short pastern.
B. Coffin bone.
E. Shuttle bone.
F. Fetlock joint.
K. Coffin joint.
P. Pastern joint.

a. Extensor pedis tendon.
b. Flexor pedis perforans tendon.
c. Periopic ring.
d. Coronary band.
e. Plantar cushion.
f. Sensitive frog.

g. Horny frog.
h. Periopic.
i. Sensitive sole.
j. Horny sole.
k. Sensitive laminae.
l. Horny wall.
wl. White line.
x. Ergot.



joint; for this reason the bone is usually called the "shuttle bone."

Elastic Parts of the Foot

29. All of the parts of the foot, except the bones, are more or less elastic or "springy" and yield when pressure is applied; but certain parts have a very high degree of elasticity, their special use being to overcome the effects of concussion or jar when the foot strikes the ground and to prevent injury, and these parts are referred to as the elastic parts of the foot. These are the *lateral cartilages* and the *plantar cushion*, or fatty frog, as it is sometimes called.

The *lateral cartilages* are two thin plates of cartilage (gristle), one attached to the top of each wing of the coffin bone, and extending backward and upward so far that their upper borders may be felt under the skin above the coronet at the heels.

The *plantar cushion* is a very elastic wedge-shaped pad, which fills up the space between the two lateral cartilages on the sides, the sensitive frog below and the flexor tendon above.

The point or front part of the plantar cushion extends forward to the ridge which separates the sole surface from the tendinous surface of the coffin bone. The base or back part is covered by the skin above the heels.

Sensitive Parts of the Foot

30. Over the bones and elastic parts of the foot is found a complete covering of very sensitive flesh. From each part of this layer of flesh some portion of the hoof is secreted or grown. The sensitive parts are: The coronary band, the perioplic ring, the sensitive laminae, the sensitive sole and the sensitive frog.

The *coronary band* is a thick band of tough flesh, about four-fifths of an inch wide, extending entirely around the top of the hoof from one bulb of the heel to the other, and lying in a groove (coronary groove) on the inner upper surface of the wall. The surface of the coronary band is covered with small pointed projections, called villi, from which is secreted or grown the horny wall of the hoof.

The *perioplic ring* is a narrow band of flesh running around just above the coronary band and separated from it by a faint groove in the wall. From the fine villi on the surface of this ring the delicate fibers grow which form the periople or hoof varnish.

The *sensitive laminae* (fleshy leaves) cover and are firmly attach-

ed to the wall surface of the coffin bone and to the lower part of the outer surface of the lateral cartilages. From these delicate leaves of the flesh grow the horny laminae, the inside lining of the horny wall.

The *sensitive sole* covers the sole surface of the coffin bone, is covered



PLATE IX — SHOWING THE TOE, QUARTERS, BUTTRESS (OR HEELS), AND BARS ..

with villi, and secretes the horny sole.

The *sensitive frog* covers the lower surface of the plantar cushion and from its villi the horny frog is secreted.

The Hoof

31. The box or case of horn is called the *hoof*, which incloses and protects the other structures of the foot, is divided into three parts—*wall, sole, and frog*. In a healthy foot these parts are solidly united.

32. The *wall* (except the bar) extends from the edge of the hair to the ground, and is divided into the *toe*, *quarters* and *buttress* (or *heels*). (See Pl. IX)

The *toe* is the front part of the wall. It is steeper in the hind foot than in the fore. The *quarter* extends backward on each side from the toe to the buttress or heel. The *buttress* is that part of the wall where it bends inward and forward. The *bar* is a part of the wall and runs from the buttress to within about 1 inch of the point or apex of the frog. The buttress, therefore, is the junction of the quarter and the bar. (See Pl. IX)

The outside of the wall is covered by a thin varnish-like coat of fine horn, called the *periople*.

The inside of the wall is covered with thin plates or leaves of horn, called the *horny laminae*. Between the horny laminae which run parallel to each other, and in a direction downward and forward,

there are fissures into which dovetail the sensitive laminae, and this union (a) binds the wall of the hoof to the coffin bone and lateral cartilages; (b) suspends the weight of the horse as in a sling; and (c) thus prevents the bones from descending on the sole.

The upper border of the wall shows a deep groove (coronary groove) into which fits the coronary band.

The lower border of the wall is called the "bearing surface" (or "spread" in the unshod foot), and is the part to which the shoe is fitted.

33. The *horny sole* is a thick plate of horn, somewhat half-moon shaped.

The upper surface is arched upward, and is in union with the sensitive sole from which the horny sole grows. The lower surface is hollowed and is covered with scales or crusts of dead horn, which gradually loosen and fall off.

The outer border of the sole is joined to the inner part of the lower border of the wall by a ring of soft horn called the white line. This line is sometimes called the guide line, as it shows where the nail should be started in shoeing.

The inner border is a Y-shaped notch, which is in union with the bars, except at its narrow part, where it joins the frog.

The horny sole protects the sensitive sole and must not bear upon the shoe, except a very narrow strip near the white line, an eighth or tenth of an inch in width.

34. The *horny frog* is a wedge-shaped mass filling up the triangular space between the bars. The lower surface has two prominent ridges, separated behind by a cavity called the *cleft*, and joining in front at the point of the frog; these ridges terminate behind in the *bulbs* of the frog.

Between the sides of the frog and the bars are two cavities called the *commissures*. Deep commissures indicate a thick sole and shallow ones the reverse. The upper surface of the horny frog is the exact reverse of the lower; it has in the middle a ridge of horn called the *frog stay*, which assists in forming a firm union between the horny frog and the sensitive frog. The horny frog assists the plantar cushion in breaking the jar or concussion, protects the sensitive frog, and prevents the foot from slipping.

Structure of Horn ..

35. The horn of the hoof presents a fibrous appearance, and consists of very fine horn fibers or tubes,

similar to hairs, running downward and forward and held together by a cementing substance. The horn fibers of wall, sole, and frog all run in the same direction, downward and forward, the only difference being that those of the frog are much finer, softer, and more elastic. They also run in wavy lines, whereas the fibers of wall and sole are straight.

They grow, as previously explained, from the small finger-like projections or points called *villi*, which cover the surfaces of the coronary band, sensitive sole, and sensitive frog.

Expansion and Contraction

36. When weight comes upon the leg, the plantar cushion and horny frog are compressed between the ground below and the structures above; this compression causes them to spread out sideways, carrying outward the lateral cartilages and bars and the wall at the quarters. This is called *expansion*.

The foot structures, however, are so held together that the coffin bone (*os pedis*) can not descend and could not come through even were the entire horny sole removed, as is sometimes necessary in a diseased foot. This being so, proper expansion without frog pressure is not possible, the force expanding the plantar cushion being exerted from below by pressure of the ground on the horny frog, and but little coming from the bony structures above, they acting more in the capacity of buffers. The result of absence of frog pressure may be noted in horses shod with heel calks and used on city pavements. The expansion being reduced to a minimum, contracted heels must result.

When weight is removed from the leg, the plantar cushion returns to its normal size, allowing the lateral

cartilages and quarters to move inward to where they were before expanding. This is called *contraction*.

The elastic lateral cartilage is merely a flexible extension of the wing of the coffin bone and would appear to have been specially designed for expansion and contraction at the quarters. It is also to be noted that the bars are a provision for this same purpose, since expansion and contraction could not take place if the wall formed a solid unbroken ring around the hoof.

In addition to breaking the jar when the foot comes to the ground, the plantar cushion has another important use. It assists in the circulation of the blood through the veins of the foot. When weight is placed upon the foot the pressure on the plantar cushion forces the blood upward through the veins; then, when the foot is lifted and the pressure is removed from the horny frog and plantar cushion, the veins of the frog again fill with blood, and this pumping action is repeated with each step. Proof of this statement is seen when a vein of the lower leg is cut. If the horse walked, a jet of blood spurts out each time he puts the foot to the ground; but if he is allowed to stand, the blood flows in a steady stream from the vein. Great injury to the foot results from starting the horse off suddenly at a fast gait on a hard road after he has been standing for some time, or when he first comes out of the stable. The circulation of the blood and the structures of the foot should have time to gradually adapt themselves to the change from rest to severe work.

Moisture

37. The wall of the healthy hoof is, by weight, about one-fourth water, the sole more than one-third, and the frog almost one-half. This

water is supplied by the blood and preserves the horn in a tough and elastic condition. The periople, which covers the wall, prevents the evaporation of water, and therefore should *never* be rasped. As there is no similar covering for the sole and the frog, the layers of horn on their exposed surfaces dry out and die. The dead layers are hard and brittle and gradually fall or flake off; but, as they preserve the moisture in the layers of live horn beneath, as little as possible should be removed in preparing the hoof for shoeing.

(To be Continued)

The Nebraska Association Convention

(Reported by C. C. Good)

The eleventh annual convention of the Nebraska Blacksmiths', Horseshoers' and Wheelwrights' Association, held recently at York, was generally acclaimed the most successful and enthusiastic of any yet held by that organization, attendance being extremely satisfactory and the state well represented by delegates from all sections. Topics discussed were of particular interest at this time to all concerned.

Some of the excellent constructive work done by the Association may be summed up as follows:

A strictly cash system of doing business was hotly advocated and it was finally voted that every member endeavor to transact business on a cash basis or at the most 30 days' cash. The question of apprenticeship was discussed from every angle and members voted that apprentices should receive 20 cents an hour for their first six months of steady work and thereafter 25 cents. A new scale of prices was adopted (copy of which follows) and it was agreed that blacksmiths and horseshoers should receive 40 cents an hour with 10 hours constituting the day's work. The Workmen's Compensation Act and the question of mutual insurance were also discussed.

The next convention was voted to be held at Auburn, and the following officers were elected for the ensuing year: President, Jens Miller, North Bend; Vice-president, G. C. Casten; Secretary-treasurer, C. C. Good. Mr. Good has now been



HORSES OF A U. S. CAVALRY DIVISION MANEUVERING "SOMEWHERE IN U. S. A."



chosen for this office for the third consecutive time.

Following is the newly adopted price list:

THE NEBRASKA ASSOCIATION PRICE LIST

HORSESHOEING

4 New Shoes (up to No. 3 and including No. 8).....	\$ 2.50
4 New Shoes (No. 4 and 5).....	3.00
4 New Shoes (No. 6 and No. 7).....	3.50
4 Shoes, Reset (up to No. 5 and including No. 5).....	1.50
4 Shoes Reset (No. 6 and No. 7).....	1.75
4 Hand made plates.....	3.50
(Calks brazed on each).....	.15
4 Hand Turned Plates, reset.....	\$1.50 up to 2.00
Gallopers Shoes, per set.....	4.00
4 Hand made plates, calked.....	4.00
4 Neverslip (up to No. 3 and including No. 3).....	3.00
4 Neverslip (up to No. 5 and including No. 5).....	3.50
4 Neverslip, Shoes (No. 6 and No. 7).....	4.00
Neverslip Calks.....	.08
1 Bar Shoe (up to No. 4 and including No. 4).....	1.25
Bar Shoe (No. 5, 6 and 7).....	1.50
Bar Plate (up to No. 4 and including No. 4).....	.95
Bar Plate (No. 5, 6 and 7).....	1.20
1/2 Bar Plate (up to No. 4 and including No. 4).....	.85
1/4 Bar Plate (No. 5, 6 and 7).....	1.15
1/2 Bar Shoe Calk (up to No. 4 and including No. 4).....	1.15
1/4 Bar Shoe (No. 5, 6 and 7).....	1.40
Packing feet, each.....	.25
8 Shoes, steel plugs extra.....	2.00
1 Rubber back pad (up to No. 4 and including No. 4) Pad 70c Shoes 65c, Packing 25c.....	1.60
1 Rubber back pad (Nos. 5, 6 and 7) Pad 80c, Shoe 70c Packing 25c.....	1.75
1 Leather back pad (Nos. 5, 6 and 7).....	2.00
4 New Shoes on heavy stallion.....	6.00
4 Shoes reset.....	4.50
Putting horse in stokes or roping, extra each foot.....	.85
Shoeing under veterinary, extra per hour.....	

LUMBER WAGON WOOD WORK

New pole complete.....	\$ 7.00
New axle.....	5.00
New bolster, old irons.....	3.00
New sandboard.....	2.50
Bent hounds, old iron.....	5.00
Hind hounds, old irons.....	1.75
Tongue hounds, old irons.....	1.50
Tongue put in old irons.....	4.00
Bolster stakes, old irons.....	1.00
Old style front hounds, one.....	2.50
two.....	4.00
Cross bar.....	1.50
New skein, a set, D. V. pattern.....	12.00
New skein and box in wheel.....	3.75
Cutting down wagon, 1 1/2 x 2 1/4.....	\$12.00 to 15.00
Filling hind wheels.....	8.00
Filling front wheels.....	7.50
New rim and setting tires.....	3.50
Half rim and setting tires.....	2.50
Axle for separator.....	\$6.00 to 7.00
New bottom put in box, work.....	4.00 to 5.00
One cross piece on box.....	1.00
New side in top box, labor.....	1.50
Stop cleats.....	.50
End gate, common.....	.75
patent work.....	\$1.00 to 2.00
New neck yoke.....	1.25
Wagon evenner, \$1.00 without iron; with iron.....	1.50
Sawed fellos, each 50c, 3 for.....	1.25
Spokes, straight 50c; 3 for.....	1.25
New hub in wheel \$2.50; wood work.....	2.00
Wagon reach.....	\$2.00 to 2.50

LUMBER WAGON IRON WORK

Bolster plates.....	\$1.50 to \$2.00
Pole caps.....	.75
Hammer straps.....	.40 to .50
Wagon wrench.....	.50
Hound plate, set \$2.25.....	each 1.25
Draw bolt.....	.50
New box in wheel.....	1.00
Top iron on box.....	1.50
Box rods.....	each .25 and up
Patent end gate lock.....	.85 to .50
Hind hound braces, new.....	each 1.25
New center clips on singletree.....	.35
New ferrules on singletree.....	each .25 to .35
New neck yoke center.....	.50 to .75
New yoke ferrules.....	each .25 to .35
Wagon singletree.....	.75 to 1.00
Seat spring.....	1.00
Seat hooks, set.....	1.00
New bolts in back bolster.....	each .50
Welding circle iron for front bolster.....	\$1.50 to 2.00
Welding half circle.....	.75
Drilling and bolting on wheels, per bolt.....	.15

Steel coupling plates.....	each .50
Cast coupling plates.....	each 1.50
King bolts, 1/2, 1 1/4, 1 1/2.....	each .50 to .75
Rub iron, per pair.....	.75 to 1.00
Steel tongue plates.....	.50
Steel double tree plates.....	.25
Setting wagon tire.....	each 1.00
Setting wagon tire, a set of four, hot \$4.00, cold.....	3.00
Setting 8-inch tires.....	4.00
4-inch tires.....	5.00
Hub band, each.....	.50
New wagon tires, besides price of material.....	each 2.00

CARRIAGE AND BUGGY WOOD WORK

Replace broken buggy tongue.....	4.00 to \$4.50
New buggy tongue complete.....	8.50
New side in shaft.....	each 2.00 to 2.50
New cross bar in shaft.....	1.50
New steel tips on buggy shafts.....	1.25
New pole circle, pole put in.....	2.00
Cutting down buggy wheels.....	12.00
1 new spoke .50, 3 for.....	1.25
New buggy reach, straight.....	1.50
New buggy reach, bent.....	2.00
New buggy evenner, painted.....	1.25
New singletree.....	1.00
Putting half rim in wheel, setting tire.....	2.25
Set box in new wheel.....	1.00
Set box in old wheel.....	.75
Straight pole cross piece.....	1.50
Neck yoke, wood put in.....	1.00
Singletree, wood put in.....	1.00
Axle beds.....	2.00
Spring bars.....	1.50
Side bars.....	1.50
Head blocks.....	2.00
Spring wagon pole complete.....	8.00
Spring wagon seat complete.....	4.00
Spring wagon box complete.....	15.00
Buggy shafts, high back.....	8.25
Seat raisers.....	each 1.50
Lazy back, open.....	1.75
Buggy shafts, black hickory.....	8.00

CARRIAGE AND BUGGY IRON WORK

New axle stubs, fifteen-sixteenths.....	\$10.00
1 1/2.....	10.65
1 1/4.....	11.90
1.....	12.50 and up
The above is for common half patent Axles.....	
Concord Axles, 1 1/2.....	20.00
Concord Axles, 1 1/4.....	22.50
Concord Axles, 1 1/2.....	25.00
Concord Axles, 1.....	27.40
Concord Axles, 1 1/4.....	31.25
Straighten buggy axle.....	1.25
Welding and setting broken axle.....	2.00
1 new stub and boxing in wheels.....	3.50
Welding pole brace.....	.65
New end on pole brace.....	1.00
Welding shaft iron.....	each .75
New shaft or pole eye.....	.75
Rub iron, set.....	.75
New clip king bolt.....	1.25
Shaft or pole coupling, 1 and 1 1/2 inch.....	.75
Buggy clips, flat or square.....	.50
Welding spring leaf.....	1.50
New buggy spring, per lb.....	.20
New rim on buggy wheel, set tire.....	\$3.00 to 3.50
New fifth wheel.....	8.50 and up
Set buggy tire, each 75c, set.....	3.00
Bolting extra.....	.50 to 1.00
New singletree clevis.....	.50
Bow socket.....	1.00
New bow in top.....	2.00
New body loop.....	1.25
New shafts, complete.....	6.25
Set wheel dished wrong.....	1.25
Buggy tire, besides price of material, per set.....	8.00

FLOW WORK

Hardening, tempering and polishing, extra on all plow work.....	
New lay, 14-inch.....	\$ 4.00
New lay, 16-inch.....	4.50
New lay, 18-inch.....	5.00
Sharpening 12-inch lay 40c each, two for.....	.80
Sharpening 14-inch lay 40c each, two for.....	.80
Sharpening 16-inch lay.....	.50
Sharpening 18-inch lay.....	.75
Point and sharpen lay, 14 and 16-in.....	1.50
18-in.....	1.75
Point and sharpen lister 14-in.....	1.75
16-in.....	2.00
Good new lister lay, 14-in.....	3.50
16-in.....	4.00
Best new lister lay, 14-in.....	4.00
16-in.....	4.50
Sharpen subsoil.....	.35
Repointing and sharpening shovels, 4 in set.....	3.00
Polishing rust, per set of 4, \$1.00 to.....	1.25
Sharpen set of four shovels.....	.85
Sharpen set of six shovels.....	1.00
Sharpening and pointing six shovels.....	3.75
New plow beams, wood.....	4.00
Straighten gang plow beam.....	2.00
Straighten walking plow beam.....	1.00 and up
Polish plow complete.....	2.00
New land side plate.....	2.00
New iron land side.....	1.00

New cross clevis.....	.75
Plow evenner.....	1.00
Lister Sharpen.....	.75
Plow singletree (pair of 2).....	1.50
Sharpening disc plow, each disc.....	2.00
Sharpen disc machine, per blade.....	.30
Broken disc replaced.....	1.50
Hammer out disc.....	.75 to 1.00
Pulverizer tongue.....	4.50
Four horse pulverizer evenner.....	2.50
Standing coulter for breaking lay.....	1.25
Restubbing riding plow axle.....	2.00
Sharpen drill shoes.....	.50
Three horse evenner.....	1.50
Plow handles, straight.....	1.00
Mouldboard.....	1.50
Cultivator handles.....	.75

MOWER REPAIRS

Weld binder sickle, furnishing piece.....	1.50
Welding new end on sickle, furnishing piece.....	1.00
Putting sections on.....	each .05
Putting sickle head on.....	.35
Ledger plates set, put on each.....	.07
Welding pitman.....	.75
New hock on pitman.....	1.25

AUTOMOBILE WORK

Single cylinder castings.....	\$ 5.00 to 7.50
Twin cylinder castings.....	10.00 to 15.00
Triple cylinder castings.....	15.00 to 20.00
Four cylinder castings.....	15.00 to 25.00
Six cylinder castings.....	20.00 to 30.00
Crank shafts, two cylinders.....	10.00 to 15.00
Crank shafts, four cylinders.....	20.00 to 25.00
Crank shafts, six cylinders.....	25.00 to 35.00
Axle shaft.....	5.00 to 7.50
Timpken rear axle housing or housings of light structure.....	8.00 to 16.00
Malleable housings.....	5.00 to 10.00
Welding exhaust manifolds (cast iron) where lugs are broken off.....	.75 to 1.50
Welding lugs on aluminum intake manifolds or water manifolds.....	\$1.25 to 2.00

MISCELLANEOUS

New mower tongue, fr.....	\$ 4.00
oak.....	5.00
Sharpening road grader blade.....	\$3.50 to \$4.00 to 5.00
Repairing scraper bail.....	1.00
Sharpening road plow.....	1.00
Sharpening coulter.....	.50
Pointing and sharpening road plow.....	2.00
Putting in fork, scoop and axe handles, each.....	.25 and .35
Sharpening stalk cutter blades straight.....	.35
crooked.....	.50
Setting tires on Manure spreader, front rear.....	2.00
All prices are regular sizes. Extra for heavy jobs.....	2.50

Labor by the hour means time only. Charges to be for all materials and stock used.

First hour, \$1.00; after, 75c. Extra charges for helpers work. Breakage, destroying or losing tools to be charged to help unless unavoidable, or any person borrowing tools.

When using Power. Labor and use of machine is worth \$1.25 per hour. On all odd jobs weigh the iron. Charge retail price per lb. for the iron.

Charge up all bolts and rivets, retail price. Time on all dirty jobs, such as automobiles, mowers, wagons and all jobs that have grease, dirt, etc., commence when you go to work and should be charged for till the tools are cleaned and put away and your hands washed to give you a chance to make change.

All book accounts are due every thirty days unless other arrangements are made. Any person not paying bills within 60 days will be charged for filing lien for work done.

ARTISAN'S LIEN ON PERSONAL PROPERTY

Section 1. A person who makes alters, repairs or in any way enhances the value of any vehicle, automobile, farm implement or tool, or shoes a horse or horses at the request or with the consent of the owner, shall have a lien on such vehicle, automobile, farm implement or tool, or horse or horses shod whether in possession of original owner or not, for his reasonable or agreed charge for work done or material furnished; Provided that the person making such repair or furnishing such material file in the office of the clerk of the county in which such work is done or material is furnished within sixty days a verified statement and description of the work done or the material furnished and a description of the article so repaired, altered or furnished, or the horse or horses shod.

Section 2. Such lien, so filed, shall become paramount to all other liens except those of like nature and shall be treated in all respects as a chattel mortgage and be foreclosed in manner and form as provided by law; Provided however, that such foreclosure proceedings be instituted within six months of the filing of such lien.



Benton's Recipe Book

To prevent rust on tools use vaseline, to which a small amount of powdered gum camphor has been added. Heat together over a slow fire.

To test the purity of white lead, which is frequently desirable in the paint shop, place a piece of white lead, the size of a walnut, in a hollowed-out piece of charcoal. Direct the flame of a blow-lamp upon it. If it is pure, the white lead will be reduced by the heat to a metallic leaden mass. If adulterated, there will be a black cinder-like substance that tells of adulteration by barytes.

A chemical test for determining the purity of white lead is to dissolve a small piece of white lead in diluted nitric acid, about one part of acid to two of water. If the lead is pure it will dissolve entirely. If adulterated a deposit remains.

To clarify shellac varnish—Even with the best of care the pattern maker will find his shellac leaving dirty streaks on the pattern from various impurities held in suspension in the varnish. These may be entirely precipitated by the gradual addition of some crystals of oxalic acid, stirring the varnish to aid their solution, and then setting it aside over night to permit the impurities to settle. No more acid should be used than is really necessary.

To arrest cutting and wear in bronze bearings when oil alone is effective, use graphite and oil.

Cleaning solutions for brass are frequently asked for and the following are recommended. A good solution may be made by mixing $1\frac{1}{2}$ ounces nitric acid, 1 drachm saltpeter, 2 ounces rain water. Let the mixture stand a few hours and then the articles to be cleaned may be dipped in quickly and then rinsed off and dried.

Or, take oxalic acid, 1 ounce; rotten stone, 6 ounces; enough whale oil and spirits of turpentine of equal parts to mix, and make a paste.

A Silver Wash Suitable for Bright Automobile Parts—Dissolve a dime, or an equal quantity of silver, and one ounce of mercury, quicksilver, in one ounce of pure nitric acid. Place the parts in a glass vessel and allow them to set until a complete mixture is attained then add a pint of water and a sufficient amount of whitening to make the entire lot in a powder. Such a silver wash may be used on brass, copper and German silver.

A Carbon Digester

A little kerosene now and then is a great help in keeping a motor free from carbon. After coming in from a run, while the motor is still warm, pour a couple of

tablespoonfuls of kerosene into each cylinder through the pet cocks or spark plug openings. Then, with the spark off, turn the engine over a few times with the starter or crank so that the kerosene is thoroughly distributed in the interior of the cylinder. By allowing this to soak in over night it will loosen much of the carbon, which will be blown out as thick smoke when the motor is started in the morning.

This treatment will not remove heavy deposits, but used frequently it will remove light deposits and keep a clean motor clean. Heavy deposits may be scraped out by opening the cylinder heads, or burned out by the oxygen method.

—Milestones.

Carbon Content and Welding Qualities of Steels

The poor workman blames his tools; the good workman assures himself beforehand, not merely that his tool is in good shape, but that it is suited for the end in view. Among other items which he must take into consideration is the matter of carbon content. He may well be guided in doing this, by the following table:

1.58,	will not weld, seldom used.
1.38,	will weld, used for hard tools.
1.12,	welds fairly, used for chisels, etc.
0.88 to 0.62,	welds easily, used for files, etc.
0.62 to 0.38,	welds readily, used for rails and tires.
0.38 to 0.15,	will not temper, used for boiler plate.
0.15 to 0.05,	will not temper, substitute for iron.

In choosing steel for any purpose, it is clear that the information afforded by this table is of value. Thus a crowbar of 1.58 per cent. carbon steel, however carefully tempered, would be inferior to one of 0.88 per cent. carbon steel, reasonably well tempered. The former would be brittle compared with the latter.

Likewise the content of phosphorus and silicon is of significance. It may be estimated that the effects of phosphorus, carbon and silicon in hardening steel and making it less capable of resisting blows are about in the proportions of 3:2:1.—From the "Scientific American."



Queries— Answers— Notes

Likens "Our Journal" to a Tool—Enclosed find check for one dollar for one year's subscription to your paper, beginning Septmeber, 1917, ending Septmeber, 1918. I like your paper and think it is as great a help to a smith as an up-to-date tool in his shop and no smith ought to be without it.

PETER LEGENDRE, Illinois.

City Blacksmith SHOP

General Blacksmithing, Horseshoeing and
Woodwork

Rebuilding Engines and Separators
a Specialty

Oxy-Acetylene welding for repairing
all your cast iron, aluminum
and other breaks

A. L. PARSONS

A KENTUCKY SMITH KEEPS BUSINESS COMING HIS WAY WITH AN AD LIKE THIS IN THE DAILY PAPER.

An Appreciation From a Knight o' the Road—I am traveling salesman for The Capwell Horse Nail Co., Hartford, Conn. I subscribe to your paper to keep abreast of things in the craft and also to be able to talk intelligently to my customer, the blacksmith, about his business and find a very great deal of pleasure and benefit from my reading. The article by Maloon on horseshoeing I find particularly interesting. I need the information I get in your columns because I am not nor have ever been a blacksmith.

W. E. VICKERY, North Carolina.

Silver Mounting on Spur and Bridle Bits—Having noticed that my subscription ends this month, I will renew it before it is too late, as I certainly don't want to miss a single copy. So I herewith enclose you a check of \$3.00, a five-year subscription of The American Blacksmith journal.

I want to ask some of the craftsmen for a little information about putting silver mounting on spur and bridle bits. Which will be the best, to solder, or braze the mounting; and also what acid or brazing compound to use? Any information will be greatly appreciated.

ERNEST HOESE, Texas.

Recharging Dry Cell Batteries—Could you give me a recipe to recharge dry-cell batteries?

We have men in our town who do it and they last as new ones. I have two gas engines and a car, and would deem it a great favor for any information.

CHAS. B. GEIGER, Pennsylvania.

In Reply:—Recharging dry cells is really quite a simple matter and may be accomplished successfully as follows:

Punch a number of holes, about the size of a pencil, around the zinc walls, first removing the cardboard containers. Then mix up a saturated solution of sal-ammoniac and water; that is, keep adding the crystals until the water will dissolve no more after standing, say, for half an hour. Pour off the solution free of the undissolved crystals and in this solution place your dry cells so the liquid does not come over their tops. Let soak for an hour or more until the filler of the cells has absorbed considerable of the solution and remove. Now plug up the holes with sealing wax or paraffin and place back into the cardboard container.

S. S., New York.

Enjoys His Paper — I appreciate The American Blacksmith greatly. I enjoy the magazine above all my papers, and if I can get my house and shop painted to suit my taste, this summer, I would like to send you a photo of it and have it



published in The American Blacksmith. It might not be the most up-to-date shop, but I know just how I got it with hammer, tongs and anvil. I remain, as ever, a brother blacksmith.

D. J. NICKERSON, New York.

From a Progressive Member of the Craft
—I have been a long time in sending a line to you although I have been a constant reader of the Journal for a number of years, and it's a hard paper to beat on any branch of the trade. I was interested in James Steelman's description of handling rock drills as I have been a mine blacksmith since 1905; before that I worked in custom shops. Now I am interested in Auto Work, Gas Engine and Oxy-Acetylene Welding. I am getting tired of mining camps and I intend to start a custom shop of my own in about another year or so. What I figured on doing was to study up some good books on Auto Repairs and Oxy-Acetylene Welding and put in a few months in some good school. With this I would be complete, as I am accustomed to all kinds of blacksmith work.

I get \$5.50 per day of eight hours where I am, but, as I am a married man and have two children, I must get them away from mining camps so I can give them a good education. I look forward anxiously every month for the Journal as I know there is always something interesting in it for me.

THOMAS HORNE, Arizona.

Will Some Brother in the Corn Belt Answer This?—I had a corn knife to temper, it had been in a barn and the barn burned down, and the steel seemed to be killed and bent like tin. I used a paste of wheat flour and salt and water. It seemed to make the knife stiff, but it wouldn't hold an edge. I know of no remedy, but it seems to me that there could be some way of bringing the steel back to life. I would also like to know how to temper an anvil cleaver to cut hot iron and steel without softening the cleaver. I would like to know of some way to make it stand up without losing the hardness.

J. T. SMILEY, Oklahoma.

More on Business and Prices in South Dakota—I want some books and charts on Horseshoeing, also on Acetylene Welding. I don't care what they cost. I have read about all I can get a hold of, and still I like to read some more. 'Tis a grand old trade and while I am young at the business, I like to hear about what the other fellow thinks is the right way to do a certain job.

No one can become so perfect but what the other fellow may have a little better way to handle the work. I read The American Blacksmith every month and only wish it came twice a month.

I have seen a good many prices that brothers are getting for work and am going to send you some of mine. I think it would be a fine thing if we were all together on most of our prices.

We get \$2.50 per 4 new shoes; 35c re-setting; 85c each for new neveralip shoes; \$4.00 for wagon pole put in; \$3.50 for buggy pole; \$1.50 for pole circle put in; 75c each for setting wagon and buggy tires up to 1½ and \$1.00 for tires wider than 1½; 30c each for spokes; \$1.25 for ½ bent rim 1½; \$1.50 for ½ 3-inch rim or \$3.00 whole wheel; \$14.00 for cutting down wagon; new rims and setting old tires up to 1½ tires.

There are three shops in town and all

THINGS THAT NEVER HAPPEN

By GENE BYRNES



From the Reading (Pa.) Herald.

of us get the same price and all visit each other when ever we get a chance. We all aim to carry a good stock. We loan back and forth, which makes it very convenient for all. I cannot see why competitors should pull and haul at each other. Every time we cuas our competitor we take just one more step backward.

There is one bad fault here and that is credit business. People seem to think it a matter of course that their blacksmith bill must and will be charged. They say, "O, just for a week or two." It seems to me that it is the way they are trained. I am thinking very strongly of going on a strictly cash basis the first of the year. That is the only fault I find with my two competitors; they seem to be afraid to try it and I hardly know what to think about trying it alone. I am now working two men besides myself and have all I can handle and have had for two years here.

What do some of the brothers think even if I have to let one man go? It seems to me there would be just about as much profit if I got paid for all work done. I have a little advantage over my competitors as I was born and raised here and they all know what I can do. Also I have two as good all round smiths as

you will find anywhere. I treat them fair in all things; do my share right along with them. I never could feel towards a man that just because he was working by the day that he was a dog or a hired slave. By treating them right I find they work willing and when I do step out of the shop they do not set down but work a little harder, if anything. We take our turns in opening shop in the morning, myself with the others and make it a point to be open on time every morning. If one of us has a little tinkering around the house, that gives him a chance to do it. Then by doing that should I be crowded at night a little we all stay and finish what work has to be done and there's no complaining done.

OTIS SHEPPARD, South Dakota.

Sawing Copper — J. Barnden in the "American Machinist," says: The ordinary metal saw fails miserably on copper, and the formed-tooth saw made especially for copper, unless very carefully ground and with precautions to see that the arbor runs true, is not much better. The trouble seems to be due to the ship compression of the soft tenacious metal. The chip wedges in the teeth to



such an extent that with a powerful machine a saw can easily be broken. This wedging action is increased by the hotter copper contracting on the saw, especially if a good flood of lubricant is not available. The ideal copper saw should be ground in the same way as a wood saw, except that it is not set as a wood saw is. This gives the necessary side rake, which allows the chips to drop out instead of wedging. Copper seems to respond to hand feeds and high speeds much better than to lower saw speeds and automatic feeds. The operator can feel the saw all the time. The pitch of the teeth should not be too fine; nor should they be as coarse as in a steel saw. About $\frac{1}{4}$ -in. pitch seems best. If precautions are taken that the saw does not rub on the side and that the saw speed is high enough, a saw ground as above will work easily twenty hours without grinding. The speed of a saw depends a great deal on its thickness, but it should not run at less than 300 ft. a minute for a saw 1-16 in. thick. It may be lubricated with tallow.

A Grind-stone Repair Kink — Above some one can get a good idea to make a lasting job to fasten grind-stone on round shaft. Take shaft, about $1\frac{1}{2}$ inches, drill $\frac{1}{2}$ -inch hole through, put pin in across one corner to the other, lay stone down level; stand your shaft in level. Take a small board and make a hole in it the size of the shaft; put under side of stone to hold the metal in, put dry sand on the board to prevent metal, when poured in, from running out. After it has cooled you will find it has shrunk a little. Drive a few horse shoe nails in at one corner and the stone will be on to stay, then turn stone true which you will find very little out of true if done right. If it is ever necessary to remove you can heat iron and melt metal out. From a Subscriber of THE AMERICAN BLACKSMITH, Pennsylvania.

Describes an Effective Pulley Remover—Fig. 1 shows a simple and effective device which can easily be made by any mechanic. It consists of two $\frac{3}{4}$ -in. diameter bolts of the hook kind, and a plate, say in cross section of about 3 in. by 1 in.; or a light

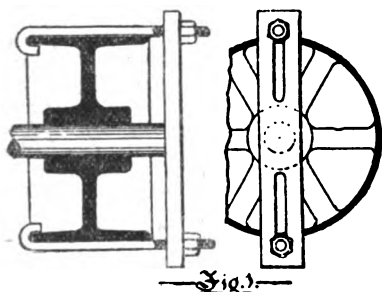
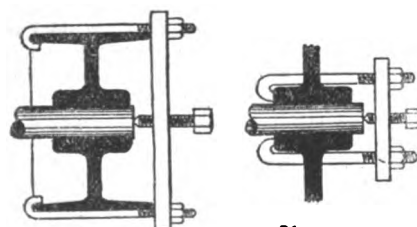
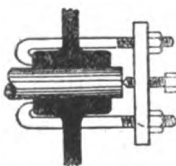


Fig. 1.

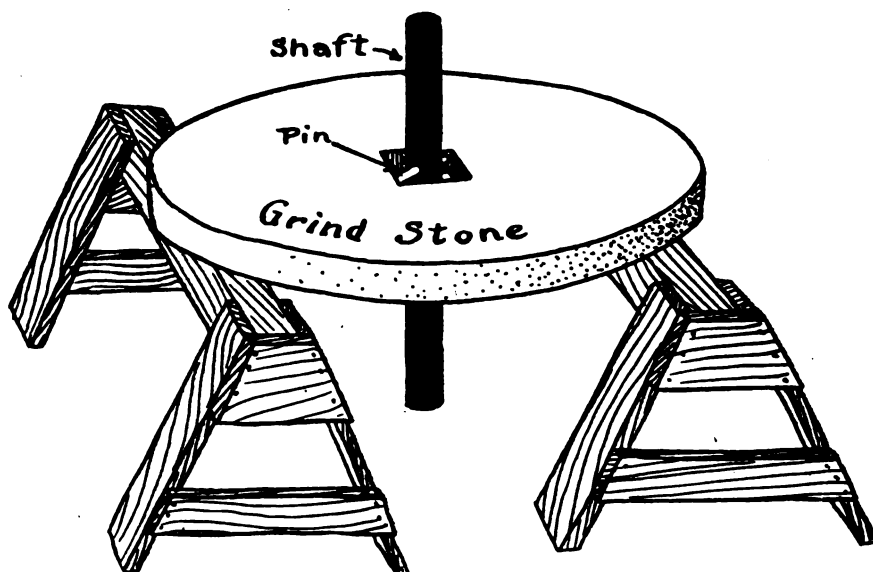


—Fig. 2.—



—Fig. 3.—

A USEFUL AND EASILY-MADE PULLEY REMOVER. DESCRIBED BY MR. PARSONS IN "WORK."



A HANDY GRIND-STONE REPAIR KINK

After preparing the hole, babbitt metal is to be poured in, making the shaft tight and solid to the stone.

channel-section bar would be stiffer and better. This bar should be provided with slots, as shown, which makes the device adaptable for pulleys of much smaller diameter. Fig. 2 shows a slight variation of the foregoing, in that the centre screw applies the pressure to the shaft end. Fig. 3 shows the hook bolts applied to the boss of the pulley, this type being preferably used on larger pulleys, since there is not present the danger of breaking the pulley arms. Furthermore, the outer plate can with this be very much shortened, thereby adding to the stiffness of the tool, and enabling a greater strain to be applied.

—“Work.”

F. R. PARSONS, England.

A Cracked Bell—As a subscriber and reader of your paper, we would like to know if a 1400-lb. church bell can be successfully welded by oxy-actylene outfit? Will it return its tone?

SCHIERBAUM & SONS, Missouri.

In Reply—Jobs of this kind are being done successfully with the oxy-acetylene welding equipment, though of course, it is necessary that an experienced welder have charge of the job. In doing this work proceed as follows: First drill a hole at the very end of the crack to prevent its going farther. Then bevel the crack to a 45-degree angle, as is generally required in oxy-acetylene work. If it is possible to secure some of the metal of which the bell was originally made, this metal will be just exactly the thing for the welding rod. If it is not possible to secure some of this metal, use tobin bronze rod and the flux recommended by the manufacturers of your equipment. It will of course, be necessary to re-heat the bell and a low charcoal fire is perhaps best suited for this purpose. You will need to watch the heat carefully so as not to get it too high, and when the bell is heated to the proper temperature, begin welding in the regular way, except that instead of attempting to fill up the entire depth of the V-shaped channel, weld only to the depth of $\frac{1}{4}$ -inch or $\frac{3}{8}$ -inch at a time and continue thus until the V-shaped channel is filled slightly thicker than the surrounding body metal.

After the entire crack is welded, allow the bell to cool slowly and test it for tone. If the tone is not what it should be, re-heat the bell carefully and to a low heat and temper it carefully in cold water until the original tone has been restored.

S. S., New York.

Benefits by the Kansas Price List — The copy of March, 1917, has been worth a good many years' subscription to me. The price list of the Kansas Association is the most complete price list I have seen printed, if you have an extra copy, I would be glad to pay for it, as the one I have shows the wear it has had. If each county could get up a price list on the same lines, and have it printed in your paper each time changes were to be made it would be a great help; not only to the particular county, but to all readers of the American Blacksmith in these times of H. C. L.

I have a good business in a live country town. Our prices are pretty good. I have a competitor who, altho a good fellow, is still shoeing for the old price, but we get all the work my man and myself can do, so it does not trouble us at all. There is not however, that brotherly feeling that used to exist before prices advanced. As a rule the man who is always looking for a place where he can get a job done a few cents cheaper is not the fellow that appreciates it. The blacksmith ought to and can get his price today if he asks for it. The customer knows, if he is honest, that no man can work for old prices while he himself is getting double for his products.

I would like to see more about plow pointing. I am a beginner at pointing and laying tractor points. Some information along those lines would be appreciated.

J. L., —An Iron Pounder, New York.

EDITOR'S NOTE—We are glad to note J. L.'s opinion of the price situation and how he has benefited by the published price list of the Kansas Association. It would be a splendid thing for the craft if every member would send in the prices

from his section. Let's hear from you, Brother.

When a Customer Refuses to Pay for Repairs—Last winter a fellow came into my shop with a two-horse front bob from a sleigh. Nothing was left of it except the two runners. He wanted me to fix it. I asked him if the hind bob was all right as it wouldn't pay to have the job done if not. He said yes, and to go right ahead and fix it, which I did. It took me about three or four days and then I called him up on the 'phone that his sleigh was done. But he was in no hurry then.

In about a month I sent him a bill for \$2.50 for stock and \$6.00 for work. A little while after that he sent his boy to my shop and offered me \$4.00. He claims now that he originally made me that offer to fix it, but he never did. My son was right there when he brought the job to me and he never said such a thing.

A little while after that I sent him the bill and told him if he didn't take that bob out of my shop, I would charge him 15 cents a day for storage because it was in my way all the while.

After that he wrote me a letter and told me he would give the bob to me.

Now I want to know if that pays the bill or can I sue him to collect my just dues. He has got the money all right if he wants to pay.

And please advise me if I have a right to charge him storage.

FRED OLDENBURG, New York.

In Reply—Occasionally a customer brings an article to a shop and asks to have it repaired, and without ascertaining how much these repairs will cost him. As a result, when the job is finished and the customer finds that the price is higher than he intended to pay, he then refuses to pay or claims that he set a price for doing the work. Naturally, the man who does the work wants to know what his rights are in such a case.

Thus, where a customer brought a wagon to a shop to be painted without mentioning the price he wished to pay, or asking how much he would have to pay, he was bound to pay the price asked for the work, providing of course, that the price asked was not exorbitant. This customer refused to pay the price stated on the bill. The owner of the shop refused to deliver the wagon until the price was paid, and also notified the customer that if the wagon was not taken away within two weeks he would sell it. The wagon was sold and the shop owner offered the customer the money received, less the amount of the bill for painting. The customer brought suit to recover the full value of the wagon. The court upheld the shop owner because he had a lien upon the wagon until the claim was satisfied.

In another case of similar nature it was held: "On the principle of the common law, that where the bailee expends labor and skill in the improvement of the article delivered to him, he has a lien for his charge."

There are, however, instances where the article repaired is not worth to another the amount of labor expended in repairing it. In such cases a lien on the article would not be satisfactory to the man who does the work.

Thus, where a customer brings two runners to a blacksmith and tells him to

make a bob for a sleigh, this bob when completed may not be of much value to the blacksmith, although it would be valuable to the customer. Should the customer refuse to pay for the making of the bob he would be liable for a breach of contract. As soon as the bob is finished it is presumed that the title to it passes to the customer, and he must accept it within a reasonable time. A reasonable charge for storage is usually allowed.

However, storage or warehouse charges are not allowed when the seller claims a lien on the article, as there can be no implied promise on the part of the owner of the article to pay storage charges when it is being kept against his will.

The customer can not escape paying for the bob by offering to give it to the blacksmith, unless the blacksmith should signify his intention of accepting it.

S. S., New York.



The Automobile Repairman

Painting the Automobile—3

M. C. HILLICK

From the Viewpoint of a Practical Vehicle Painter

To date there has been comparatively little burning off or removal of the old paint film for the very good reason that cars have been going to the scrap pile quite as soon as the paint has given out, and in many cases before it has failed in its protective work. With the coming of cars which are better made and with longer wearing qualities, owners are finding it good business to have the old paint taken off once it has worn to a non-protective condition.

There are, at the present time, two methods being used for the removal of the old paint structure; namely, burning off, and through the use of a paint and varnish remover. This latter is a most efficient method for the removal of paint and varnish from metal surfaces and in the writer's estimation, a stride in advance of the old method of taking off with the burning torch.

Of paint and varnish removers there are two kinds, paste and liquid.

The latter is suitable for tanks and vats in which small parts of the car may be dipped to advantage. The paste remover, of which there are many makes—and most of them, at least, efficient and reliable, is best adapted to surfaces which cannot, on account of size and construction, be dipped or submerged into a tank or vat. The paint and varnish remover has the advantage of being suited for use in buildings and in places from which the paint torch or burner would be barred by virtue of the insurance regulations. It is, under careful handling, about as safe as anything of a similar nature can be made. As a rule it is explosive only when a lighted match or torch is allowed to be taken in proximity to the open container, and this practice would hardly be tolerated in the vicinity of numerous other materials used in the painting of vehicles. Under reasonable and careful handling these paint and varnish removers are as safe as not a few other mediums which, as painters, we handle daily without fear.

The main consideration consists in making the surface perfectly clean after taking the finish off, for if any traces of the remover are left upon the surface, and the painting is proceeded with, there is certain to be trouble. The various coatings are sure to fail to dry through or from the bottom out, with the result that wherever this condition is found to exist, the paint must be taken off and the surface given a thorough cleaning and the work again brought up from the bare metal or wood. With an old, partly worn round or oval bristle brush the paste can be applied to the surface. A little experience will teach the workman about when the old finish has been eaten into sufficiently to let go right down to the metal or wood; it may be, of course, that the first application will only take off the outer part of the old fabric, especially if the finish should be baked on. By repeating the application a second or third time, the old structure of pigment will usually come off right down to the foundation. A broad, half-elastic scraping knife, together with a one-and-one-eighth inch blade knife will be needed to take the work along promptly and efficiently. The first scrapings, if kept in a container and wet up with some liquid paint and varnish remover, may be used a second time, and not infrequently, a third time, for removal work. This will prove a source of economy, and will make it necessary

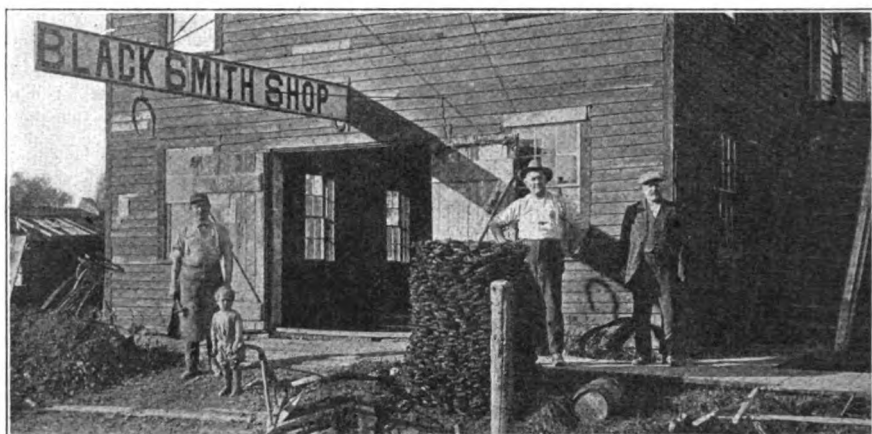


to carry only a gallon or two of the liquid remover in stock. In addition to being used as an extender of the paste product in cases above named, this liquid remover will be found useful for numerous things which come along with the finish needing removal.

After the surface has been cleaned with the knife and scraper as thoroughly as possible, the next step will be to saturate it freely with either vinegar, turpentine or alcohol. A plan the writer is familiar with is to first saturate the surface with turpentine and wipe dry; then follow with a wetting up with alcohol, wiping dry as before. The essential thing is to get all traces of the remover caught up clean and dry, and the surface neutralized perfectly. Vinegar is used for this purpose very effectively, the acid in the vinegar being especially active in destroying the elements in the remover actively antagonistic to the drying properties of the pigment. However, turpentine and alcohol will accomplish the same work if rightly handled.

If the shop is furnished with gas the burning may be performed with this medium, although as compared with the gasoline method, it is much slower. Where burning is not carried on extensively the gas jet burner may be used successfully. The gasoline torch, when used, should be supplied with a 75 degree fluid; better work and more of it can be performed, with the additional advantage that the mechanism of the burning lamp or torch is not clogged up with substances which may be called by-products of the fluid passed off during the burning process.

Having the old paint and finish completely removed, the next step consists in sandpapering the surface down hard and close for the first or priming coat. This coat, if made in the shop, should consist of one part raw linseed oil to three parts of turpentine, the pigment being lead or some good oxide paint. For the second coat add an equal amount, bulk measurement, of roughstuff filler, fetching the mass up to a stiff consistency with equal parts of coach japan and rubbing varnish, and then thinning down to a brushing consistency with turpentine. Upon this second coat of bodying-up material, putty all surface defects with a hard drying putty. Then for good work—perhaps we had best say, the highest grade—apply three additional coats of roughstuff. Stand



MR. H. E. FACKLAM'S BUSY WISCONSIN SHOP WHERE HORSESHOEING AND ALL KINDS OF REPAIRING ARE DONE. WE WOULD SUGGEST THAT MR. FACKLAM TRY TO SELL THAT BIG PILE OF OLD SHOES IN HIS FRONT YARD. THERE'S MONEY IN 'EM THESE DAYS!

aside for a week, if possible, before rubbing the 'stuff, thus allowing the material to cure out and harden for a better finish than might otherwise be produced. After the rubbing work has been completed let the work stand over night before coating. This permits the moisture to evaporate, and insures the finish against the development of a series of surface outbreaks which come under the head of varnish deviltries, and are well known among carriage painters. One coat of color, for the ordinary dark colors, solid covering, will suffice; over this apply a coat of varnish-color, working the material on freely. A good body of varnish-color provides a depth of lustre and a freedom from a brushy appearance at all times desirable, and of course essential to a fine finish. The next coat of rubbing varnish should have enough color in it, if the field color is black or deep green or blue, to counteract the discoloring property of the varnish. Varnish, it is important to bear in mind, gives any color, and makes it very clear in a light, delicate color, a greenish shade; by using some of the color in the earlier coats of rubbing varnish the surface is kept true to tone and shade. The last coat of rubbing varnish, especially when it is necessary to apply striping and ornamental lines, should be a clear article without any coloring matter in it. All these coats will need rubbing with water and pumice-stone flour; the first one just enough to flat the gloss and break down any existing nibs and specks of dirt. The second coat may get a little heavier rubbing, and the third coat the real solid rub. In case but three coats of rubbing are used—always counting the varnish-color coat as a rubbing

coat—the second coat should get the hard rub; the last coat of rubbing should always be esteemed about the equal in point of brilliancy and body of the finishing coat, hence the rubbing will need to be, as a rule, simply in the nature of a light rub for refining purposes.

Before concluding this last rubbing it is a safe practice to take a piece of clean felt, and, dipping it into the water until it is well soaked, proceed to give the surface what in shop terms is called a water rub. This will serve to finish off the surface nicely and remove all traces of the pumice-stone flour, especially preventing it from being ground into the varnish film. In rubbing the varnish this pumice-stone flour appears to be rubbed into the varnish, producing a milky effect. When the water rub is resorted to this condition is eliminated and a better finish assured. In washing up for the finish it is a safe rule to provide two separate sets of pails, sponges, chamois skins and water brushes—one set for the first washing and one set for the final washing. The painter in the small shop is given to marvel at the splendid finish, clean and deep in its brilliancy, which the city and factory shop painter is able to produce; part of this is due—it may fairly be said, an important part—to the very thorough washing up methods in vogue in these shops. The surface will need washing carefully in a manner to carry away the greater part of the foreign matter, pumice-stone flour, etc. After this wash again, using the remaining set of utensils for the work. Tool out with the wash brush all corners, moldings, surface ornaments, etc. Get the under edge of the car body with the sponge; plenty of dirt is



found here at times, and if allowed to remain the varnish brush is more than likely to pick it up and distribute it over the surface and thereby spoil an otherwise good finish. Use water generously in washing; this helps flood the surface of accumulations. Use a wash leather or chamois-skin entirely free from lint or particles of leather sloughing off. Wash this leather frequently in soap and water to keep it clean and devoid of adhesive dirt and dust. In using the wash leather do not attempt to rub the surface dry. Rather just work over the surface, using the leather with an easy pressure sufficient to catch up the moisture except a fine misty condition which will evaporate quickly and leave the surface in a finer state to finish than if it were rubbed dry by main strength.

The next move consists in dusting the surface for the varnish. This is first done with a fine, white bristle duster, oval or flat, to suit the choice of the workman. Then take a soft, fleece wool sponge and moisten gently with a few drops of olive oil and rub over the surface. Next, with a piece of silk, clean and soft, wipe the surface very clean; finish off finally with a second duster to be used only for this work. Keep this, and in fact, all dusters, clean by washing now and then in soap and water; then rinsing in clean water, afterwards rolling the handle of the tool between the palms of the hands until the stock of the duster has become dry and fleecy and capable of picking up the slightest and finest dust atoms.

In the actual work of applying the varnish there is much to be learned from experience; general directions can only be offered; details must be worked out as the user of the brush proceeds and becomes acquainted with both the brush and the varnish. The most experienced finisher must know his varnish; thus he learns to take advantage of its individual characteristics, to feel certain of its action under all normal conditions. For this reason the best finishers dislike to change from one varnish to another. Knowing and believing in one make and grade—having confidence in it, in fact—they prefer to use the varnish with which they are perfectly familiar. As a rule, in varnishing lay the material off the long way of the panel, flowing on a good rich coat of the varnish. Fill in the panel and then cross brush the varnish. Then with brush strokes going the long

way of the panel, or the way the varnish was flowed on, lay off the material in a way to straighten out the varnish and give it a uniform distribution and an even flow. For this work use a brush suited to the size of the surface; either a 2½ or a 3 inch, flat, full elastic, bristle brush of finest quality. Also use an inch badger hair, flat bristle brush for picking up the drip and for running the edges of the surface. Make the room in which the varnishing is done as clean as possible; also keep clean personally. Have the room temperature and the temperature of the varnish as near alike as possible; preferably 70 degrees, and maintained at this degree while the varnishing is going on and during the drying of the varnish for some hours following its application. This

particular process is the crowning work of all that enters into the finish; too much attention cannot be paid it, for a failure here means a failure for all that has gone before.

(To be Continued.)

A Quick Start in Winter

The choking devices now supplied with most good cars make starting easy even in the coldest weather. While a heated garage is a great comfort it is far from necessary. However, an oil can filled with high-test gasoline or with a mixture of gasoline and ether is a great starting help in emergencies. By squirting a bit of the liquid into each cylinder through the pet cocks or into the manifold a quick start is assured. Be sure that your carburetor adjustment is right for cold weather driving.—*Milestone*

Are you "doing your bit" in saving food for our allies and our soldiers and sailors?

A Patriotic Duty of Every American is to

PREVENT FIRE



Learn the Rules



Don't Smoke



Report Suspicious Strangers



Clean Up at Home

America at war needs every ounce of her energy and resources. It is criminal to cause hazards; it is unpatriotic to neglect them. Here are some of the ways in which you can help:

1. Learn the factory safety rules and observe them.
2. If you discover a fire, give the alarm promptly. Do you know how to do this? Ask to be shown.
3. **Don't smoke** where it is not permitted.
4. Never drop a lighted match, cigar or cigarette; be sure that it has no spark left before throwing it away.
5. Report suspicious strangers seen about the plant.
6. If you notice any unusual smoke, the overheating of any machine, or any other accident, notify the foreman at once.
7. Carry your precautions into your own home; keep your house and yard free from rubbish, and help others to do the same.

Where would **your** job be if this plant should burn?

Help Uncle Sam

BE CAREFUL

Approved by the National Board of Fire Underwriters
Endorsed by the Council of National Defense



Send Alarms Promptly



Extinguish Matches



Report Smoke or Accidents



Factory Burned—Job Gone

SAFEGUARDING AMERICA AGAINST FIRE

This circular appears on the walls of industrial plants in every part of the country. It was sent out broadcast in a recent campaign which had as its purpose the safeguarding of America against the preventable fires which take such a terrible toll every year from the resources of the Nation. While it may not apply as directly to you—who, perhaps, are running a small shop of your own, as to the man in the big industrial works it should make you think and should impress on you the fact that the prevention of fire is not merely a personal precaution, but a patriotic obligation.



Over Here!

Say, you red-blooded fellow Over Here, take down the receiver and listen to a line of talk that ought to get under the hide and into the heart of men of your brand.

You are a skilled man. You have been fighting life's game in a country where every man has an even chance to make the most of himself. You are an American, and all that you are and all that you hope to be, reflects to the credit of a democracy.

That democracy is being assailed by the most damnable foe that ever fired a cannon, that ever drove home a bayonet, that ever ravaged a neutral state, that ever sunk a hospital ship, that ever shelled women and children in lifeboats, that ever crucified and castrated captured enemy soldiers, that ever cut the right hands off boy children in captured territory, that ever raped women by the thousand, that ever lived to fasten its demon clutches on the throat of civilization.

Almighty God will not permit the unleashed hellishness of Kaiserism to engulf the world. No sane thinking man can conceive of an all wise and all loving supreme Deity permitting our section of the world to become under German leadership—the stench of the universe, but now, not tomorrow—right now—Almighty God needs the help of trained men.

It has been said repeatedly by men who ought to know what they are talking about, that this war will be won in the air. Uncle Sam is building an air fleet that will astound the fighting world. Factories from Main to California are working day and night on aeroplane parts. Guns and oil and gasoline and cameras and other material parts of these war machines are coming along as fast as skilled organized American factories can bring them out. Already they are being assembled, and that acme of the American get-together spirit. The Liberty motor, is being installed.

Ever since this great war started the government has been establishing aviation schools to perfect the bird men who will be the eyes of the national army. These schools have already turned out a mighty healthy number of those fearless chaps who can climb to dizzy heights, loop the loop, spiral with the engine cut off, repair a jammed machine gun and get it into action before they reach the ground, and there are thousands more well on the road to their commissions, and they are getting into the seats of the new machines almost before the paint is dry on the initials U. S. A.

The machines and many of the fliers are taken care of, but there is a crying need of trained men to care for these machines, and those men will be forthcoming when the need is known.

There is a blank at the bottom of this page that when properly filled out will make a glorious chapter in the history of this country. It will be the answer of skilled gentlemen to the challenge of skilled brutes.

But let's get down to cases. Do you drive an automobile? Thank God, if you do and sign the blank.

Do you know anything about a gasoline engine? Thank God, if you do and plaster your name on the blank.

Are you a machinist or a machinist's helper? Thank God that your time in the land of the free has been spent learning a useful trade, and put your signature to the blank, firm and right in your conviction that it is the greatest act of your life.

Do you know skilled men, and have you any influence with them? If you have put that influence to work put your shoulder to the wheel, remind yourself that war is now the business of America and that we are threatened with all those things Germany has taught the world to expect from her. Spot your skilled men, and if they are not working on war essentials shoot some of your brand of Americanism into them.

MEN OF DRAFT AGE: If these remarks reach you and you are interested in the Aviation Section of the Signal Corps, but cannot enlist as a volunteer on account of the War Department's ruling which barred voluntary enlistments of registered men after December 15, 1917, reach for your pen NOW and write to the Volunteer Department at 119 D St., N. E., Washington, D.C., for full information regarding selection for the air service.

If you are 18, 19 or 20 years old, sign the blank and become a man.

If you are between 32 and 40 years of age and qualified, sign the blank and put your name where it belongs among those who know no obligation greater than their love of country.

There has never been a greater appeal to skilled men. There probably will never be a greater need of skilled men called upon to perform a duty so essential.

In God's name, you skilled men, recognize this emergency. Know a need when you see one. Discern between German made news and American made news. This is no six months' war. It is a fight between principle and despotism, and it is a finish fight.

Uncle Sam NEEDS skilled men. He puts his need up to you. In humanity's name, sign this blank with a hand that doesn't shake. It's an opening for a body blow at Autocracy.

HERE IS A LIST OF THE KIND OF MEN WANTED

Blacksmiths.
Automobile Engine Repair Men.
Auto Mechanics.
Chauffeurs
Painters.
Motorcyclists.

Automobile Engine Festers.
Metal Workers.
Magnet Repair Men.
Motorcycle Repair Men.
Machinists.
Coppersmiths.

Tool Makers.
Vulcanizers.
Welders.
Saddlers.
Truck Masters.

Stock Keepers (Exports).
Carpenters.
Office Clerks.
Electricians.
Draftsmen (Mechanical).

JUST FILL IN, CUT OFF AND MAIL ONE OF THESE SLIPS

Volunteer Department, 119 D Street, N. E., Washington, D. C.

I desire to enlist, as a skilled workman, in the Aviation Section of the Signal Corps.

Name Age

Address

At present employed with

Trade No. yrs. in trade

THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING,
VEHICLE WORK and AUTOMOBILE REPAIRING

VOLUME 17

FEBRUARY, 1918

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THIS IS YOUR MAGAZINE

What is most imperative just now—from the standpoint of our readers and subscribers—is that each and every one, whether in the East, West, North or South, shall come to a full realization that this publication is for YOU and that you have a very important part to play in its present and future.

To represent each of these sections of the United States, there must be contributions from every state and from each and every locality. We want to give every section its due, but this cannot be done if the material is not at hand.

Don't wait for us to write to you: send your items in at once; photographs of your shop, your "jobs" and the short cuts in working that will help a brother reader in some other section.

In return for these things, we want you to feel at perfect liberty to call on our Subscribers' Service Bureau for any assistance or information that you desire with the full assurance that your wants will be speedily and intelligently cared for.

BIG FIELD OPEN FOR REPAIR SERVICE

The new dignity with which the war bids fair to invest the various branches of repair service is due to two new influences—the spirit of economy on one hand and, on the other the increasing difficulty that the retail trade is having in stocking new goods.

A short time ago the Department of Agriculture appealed to the farmers of the United States to resurrect and repair the countless farm machines that have been rusting in barns and fence corners, but which it is declared, are in many instances good for years of service if given attention in the form of repairs and replacements. A considerable part of the public has not waited for any such appeal but either from choice or necessity is having the old machinery put into shape for operation.

KEEPING UP WITH THE TIMES

With an insistence that has been impossible to overlook, the demand for automobile and tractor information has made it necessary for us to include a great deal more of this class of matter than in the past and to do this it has been found necessary to make a number of important changes in The American Blacksmith.

As a result of these changes and our decision to broaden our field, to keep pace with the times in which we live and to be of the utmost possible service to our subscribers and readers, the name of the magazine beginning with the March number, will be the AMERICAN BLACKSMITH, AUTO AND TRACTOR SHOP.

This change we feel, is a necessary one and one that will be appreciated by our readers as a most progressive step.

The further development of the automobile and the dawning era of the farm tractor offer untold possibilities to the wide-awake and hustling shopman and it is our desire to pave the way for his progress in this direction, to help him solve the multitude of new and unfamiliar problems that will arise as he swings into this field and to be in short, the "ever present help in time of trouble" that "Our Journal" always has been in the past.

APPRECIATION

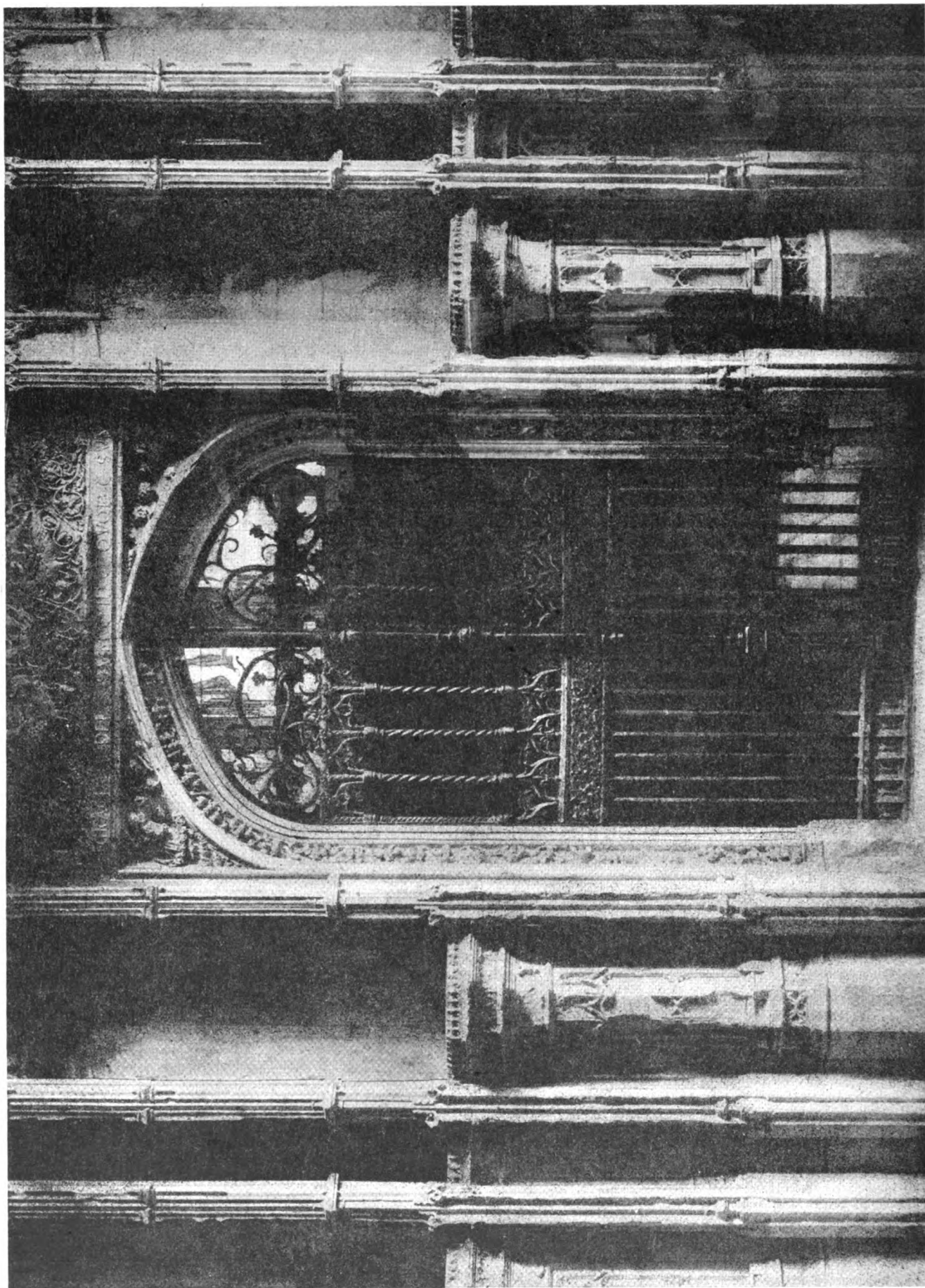
"Enclosed find check for renewal for two years to the paper. I thought I would get me something for Christmas and this is what I decided on.

(Signed) T. A. TIREY,
Mitchell, Indiana."

Don't give money to agents unless you are sure who they are. Every authorized AMERICAN BLACKSMITH agent will gladly show you his letter of authority to take your order. When in doubt, send money and order direct to Buffalo, N. Y.

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A SPLENDID EXAMPLE OF THE WORKMANSHIP OF THE OLD-TIME BLACKSMITH—THE BEAUTIFUL WROUGHT-IRON GATE OF ELY CATHEDRAL, ENGLAND



The Effect of Secondary Heat Treatment on the Cutting Properties of High-Speed Steel

JOHN JERNBERG

DURING the last few years, high-speed steels have played an ever-increasing role of importance in our great manufacturing industries. Choice of material, design, workmanship and heat treatment have each received careful attention with a view thereby of increasing efficiency and intensifying production. However, of late, much doubt has been expressed by manufacturers as to whether the best properties of these steels have been fully brought out and this has led to investigations as to the effects of secondary heat treatment on the cutting properties of high-speed steel.

Herein is related an experiment conducted along these lines at the Worcester Polytechnic Institute.

Statement of the Problem

The preliminary heat treatment of high-speed steels has been the subject of such thorough investigation that the conditions necessary to obtain the best results are well known. Hence, the problem before us is to determine the effect of secondary heat treatment, especially as it has to do with the cutting properties of high-speed steel on gray cast-iron. We must determine, first, if this secondary heat treatment is of advantage; and, second, find out the proper temperature of the secondary heat for a given steel and a given preliminary heat treatment.

Realizing that the heat treatment, to give the best results, varies with the steel used, we chose one that had been previously experimented upon for the proper preliminary heat treatment and decided that this would serve us best for the solution of the problem at hand.

Description of Apparatus and Method Used

In order that a general idea of the effect of the secondary heat treatment on the steel could be obtained, it was decided to run a preliminary test covering a large range of tem-

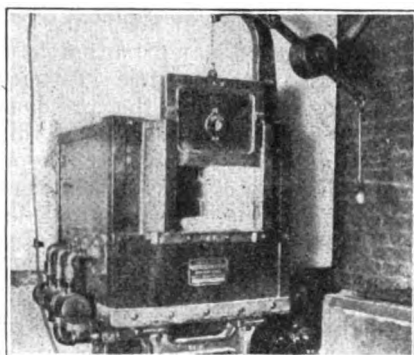


FIG. 1—SHOWING THE GAS FURNACE USED FOR THE PRELIMINARY HEAT TREATMENT

peratures. In this way, if the secondary heat treatment was of advantage, we should be able to determine approximately the temperature which gave the best results. Then, on a second test, smaller increments of temperature could be taken above and below this critical point of the steel in order to feel assured that this was the point of maximum endurance.

It was decided that seven heats would be used—six of these being secondary heat-treatment temperatures of 600, 800, 1000, 1200, 1400 and 1600 degrees Fahrenheit; the other being no-secondary heat treatment. Since it was not practical to regrind the tools, we thought it desirable to make three tools for each of the seven increments in the secondary-heat treatment temperatures, and, thus, make it possible to check each test.

The tools, which had been previously experimented with for correct preliminary heat treatment, were in the form of bars $1\frac{1}{2} \times \frac{3}{4} \times 7$ inches. It is necessary that the specimens receive exactly the same preliminary heat treatment, but, to be sure that this is obtained, they should receive it at the same time. On account of the small size of the

furnace at hand it was impossible to do it with this size of tool, and for this reason these tools were drawn to a cross section of $\frac{1}{2}$ -inch square under a trip hammer, and cut into three-inch lengths to fit an Armstrong tool-holder.

The furnace used for the preliminary heat treating was a gas furnace having a heating compartment 14 in. x 8 in. x 6 in. The furnace was rated for a maximum temperature of 3000 degrees F. and as 2250 degrees was the temperature of this heat we were well within the limit of the capacity of the furnace. It was heated up and at various intervals the door was opened to note the color of the interior which proved to be very uniform indeed, showing that the heat was even throughout. Fig. 1 shows a view of the furnace used for this work and Fig. 2 a diagram of its construction. The temperature of the furnace is regulated by means of two valves, one regulating the gas supply and the other the air supply.

Having successfully solved the problem of obtaining the preliminary heat treatment of the specimens, the next item of importance was to find a means of obtaining the temperature of the specimens so as to know when the 250-degree mark was reached.

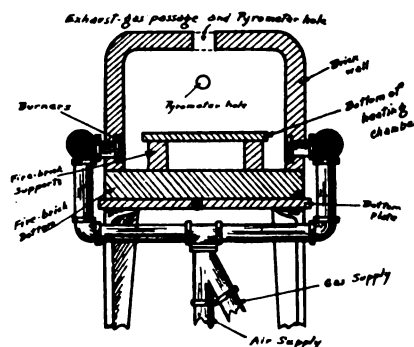


FIG. 2—DIAGRAM OF CONSTRUCTION OF GAS FURNACE SHOWN IN FIG. 1.



A new pyrometer of the thermo-couple type was connected by wires to a milli-voltmeter which was graduated to read in degrees Fahrenheit. In order to check the accuracy of the pyrometer and apparatus a test was made of the apparatus. Salt was melted in a cast-iron crucible in a gas furnace; the end of the thermo-couple was then placed in the molten salt solution, and the gas turned off thus allowing the salt to freeze. The molten salt was watched carefully until it was observed to freeze; the reading of the instrument was then noted and recorded to be 1445 degrees. Since the freezing point of salt is known to be 1472 degrees we concluded that the pyrometer read 27 degrees low.

We now had a method of obtaining the preliminary heat treatment and also a method of obtaining the temperature of the furnace; the next step was to determine the best method of getting the secondary heat treatment. As has already been stated, the temperatures for this heat were to range from 600 to 1600 degrees by 200 degree increments. We found that the gas furnace was not very good for obtaining these results owing to the rapidity of the

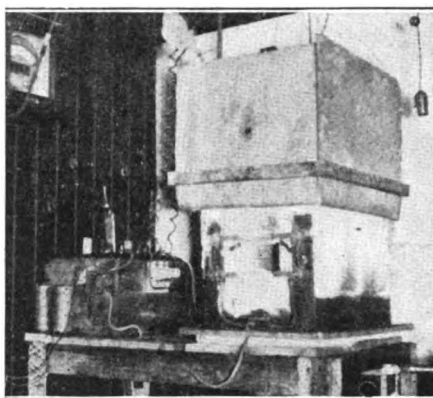


FIG. 3—VIEW OF THE ELECTRIC FURNACE

rise in temperature at low heats. We therefore turned our attention to a carbon-resistance electric furnace that had been built the previous year. We looked up a thesis on this subject, and the statements made on the possibilities of the furnace were very encouraging. We therefore determined to test this furnace to see if it was adapted to our use.

The electric furnace consists of two crystalon muffles, one inside of the other, the inner or smaller muffle comprising the heating chamber of the furnace, measuring 3 in. high,

4½ in. wide, by 10 in. long. The space between these muffles is filled solidly with granulated carbon which is used in connection with the electric current to obtain the heat for the furnace. The electric current is brought into this granulated carbon through a hole in the outer muffle, which holds a carbon plug. The connections to the other side of the furnace are made by means of four carbon plugs. The furnace is insulated from heat radiation by a layer of insulating material called "sil-o-cel" to a thickness of 2¼ inches around the outer muffle. The regulation of the current for the operation of this furnace is obtained by means of a transformer that has sixteen steps in the regulation. The primary side of the transformer is connected to a 220 volt A. C. line, and the transformer is protected by 20 ampere fuses. An overload apparatus is placed in series with the furnace on the secondary side of the transformer. This is arranged so that when the current on the secondary side reaches 100 amperes a bell will ring, thus warning the operator to decrease the current passing through the furnace. Fig. 3 illustrates the furnace and transformer and Fig. 4 gives the de-

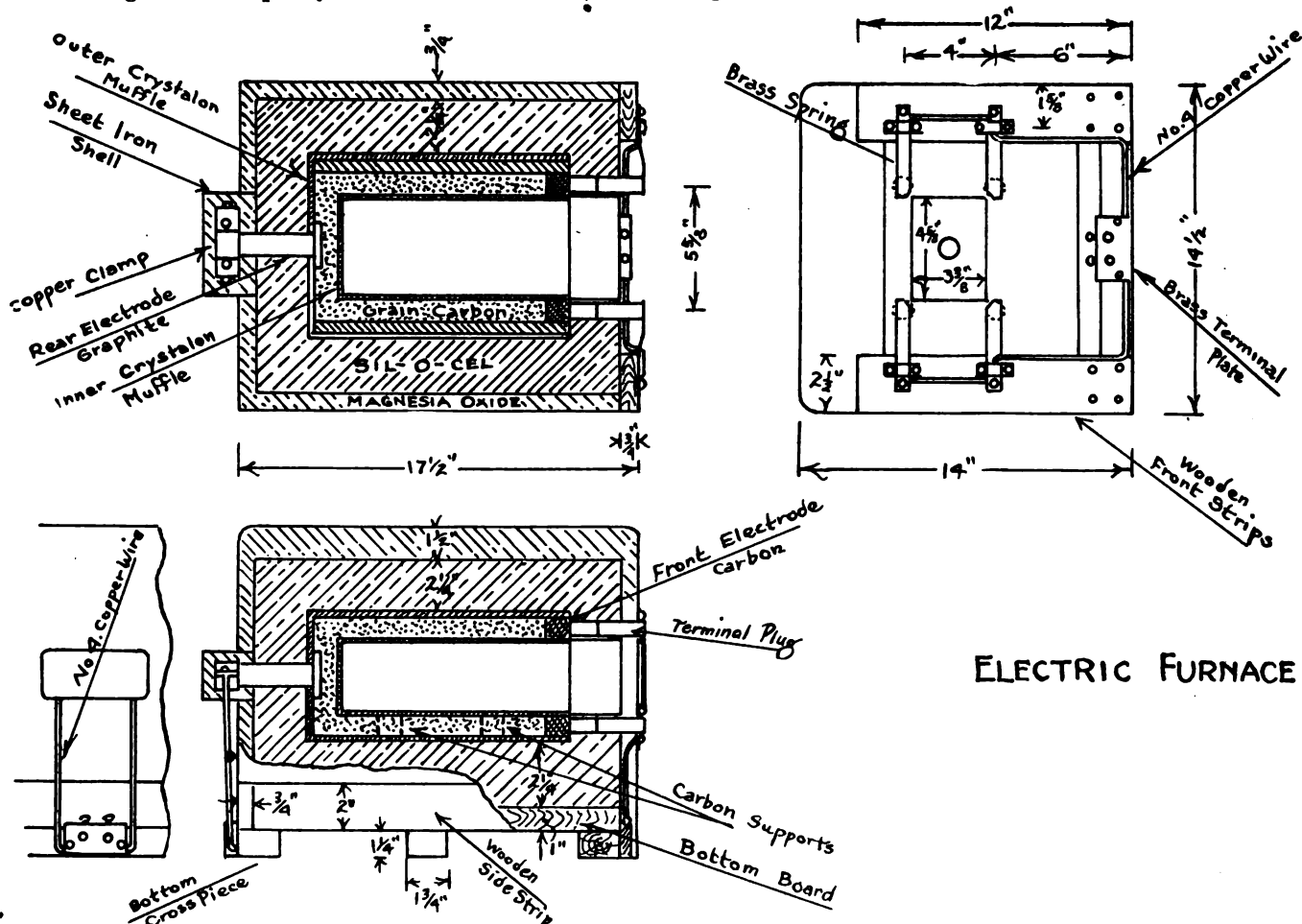


FIG. 4—DETAILS OF CONSTRUCTION OF THE ELECTRIC FURNACE

ELECTRIC FURNACE



tails of construction.

There was one other item left to be considered before this experiment could be performed; this being the shape of the tool to be used. It must be remembered that this test was a comparison between the effects obtained under different conditions

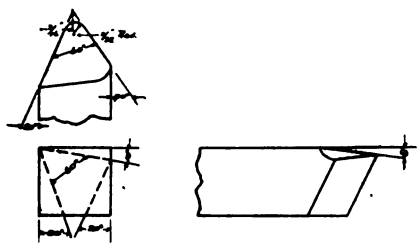


FIG. 5—THE TOOL SHAPE USED

of heat treatment, and it is therefore seen that, whatever tool shape was decided on, this shape must be kept constant and all the tools must be ground exactly the same way. In looking up the subject of tool shape we found one that past experiments had shown to give the best results for cutting gray cast-iron. This was a complicated shape made up of many curves. After experimenting some time to get this shape we came to the conclusion that a simpler tool shape would be better adapted to our needs. In this connection we decided that simplicity was a necessary requirement for the obtainment of a uniform shape on all the tools; we therefore chose a tool shape, the faces of which were plane surfaces. This tool will be seen in Fig. 5 and the tool-bit holder is given in Fig. 6.

The problems attending the preliminary heat treatment, the obtainment of the heat-treatment temperatures, the secondary heat treatment, and the tool shape, were now solved. The next item to be considered was the method of testing the tools. We decided that a test specimen, 36 in. long, 8 in. outside diameter, and 4 in. inside diameter (Fig. 7) would be very good to employ since this sort of specimen had been used on similar work and had proved very satisfactory. These test cylinders were cast on end and were poured through a sprue in the center of the core, the outlet into the mold being at the bottom of the core. This is supposed to give a very much better grade of casting and a more uniform condition of metal.

Since the lathes in the Washburn Shops were not heavy enough to stand the strain to which we expected to subject the tools we obtained permission to use some larger lathes at the machine shop of an outside company.

Performing the Experiment

The tool bits when drawn down from the bars and cut into three-inch lengths numbered 22 tools. We needed only 21 for our thesis work, however, and these were numbered and lettered. The tools that were to receive the various secondary heat treatments were given different numbers, and the three tools at each of these heats were lettered A, B, and C.

By reference to Fig. 5 it will be seen that the tool shape employed is made up of plane surfaces; these were obtained by the use of a surface grinder. The tables of the surface grinder (see Fig. 8) were adjusted so as to give the desired angles. In order to insure uniformity of angles for all the tools each angle was carefully tested with a protractor after grinding. The tools were then ready to receive the heat treatments. It has been found that the proper preliminary heat treatment temperature for this kind of steel is 250 degrees Fah., and this was the temperature used.

In subjecting the specimens to this heat treatment, the furnace was allowed to reach a temperature of

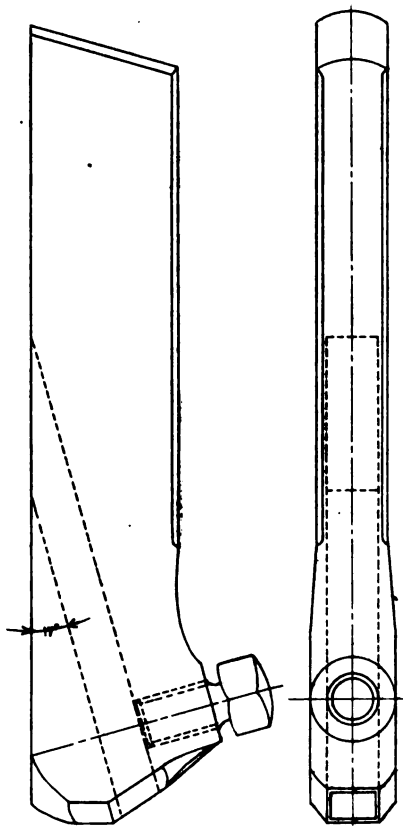


FIG. 6—TOOL-BIT HOLDER

approximately 1800 degrees before placing in the furnace on a piece of steel plate. This did not rest on the bottom of the furnace, but was held

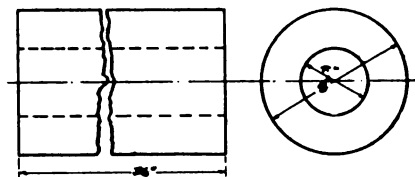


FIG. 7—THE CAST-IRON TEST CYLINDER

up about $\frac{1}{2}$ in. by two iron strips that were placed under the ends of the steel plate. This furnace, as has already been stated, was observed to give a very uniform heat throughout the heating chamber, and this was further confirmed by observing the uniform color of the specimens as they lay on the plate. At the 2250-degree mark the specimens were removed from the furnace and all quenched at the same instant in a bath consisting of equal parts of machine oil and kerosene oil.

The reason for waiting until the furnace was up to a temperature of 1800 degrees before putting in the specimens was to reduce the amount of oxide that would form on them during the heat treatment process. The formation of oxide on our specimens would probably not have had a very great effect on the results as we already had intended to give the tools a regrinding. At the same time, however, we decided that it would be better to prevent the formation of any undue amount of oxide.

The specimens were left in the oil bath over night, so we are sure that they were thoroughly cooled before their removal. The reason for having one set of tools, which had been subjected merely to the preliminary heat treatment, was for the purpose of establishing a basis or standard by which to judge the results obtained from the secondary heats ranging from 600 to 1600 degrees, inclusive. This secondary heat treating was done in the electric furnace, the tools being placed in the furnace on a plate as before. All tools were placed in the furnace at the same time, and when the right temperature was reached the proper set of tools was removed and immediately plunged into the same oil bath that was used in the preliminary heat treating. The tools were left in the oil until they were thoroughly cooled, then taken out and the oil cleaned off.

Next, the tools were reground to remove the oxide that had been formed in the heating process. Care was taken to see that the tools were not heated in this regrinding since



it would have modified the effect of the secondary heat treatment.

It was decided to test the tools for Brinell hardness in order to get an

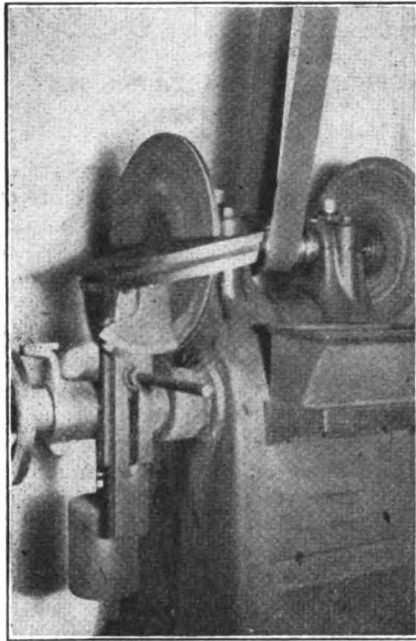


FIG. 8—THE SURFACE GRINDER

idea of the effect of secondary heating on the hardness of the tools. A spot was made on the back of each of the tools with the surface grinder to remove the oxide and obtain a bright surface. The specimens were then placed one at a time under the ball of the machine shown in heading cut, and a pressure of 3000 kilograms applied for 30 seconds. The diameter of the impression made by the ball of the hardness machine was measured by a microscope, from this the hardness was read from a chart furnished with the machine.

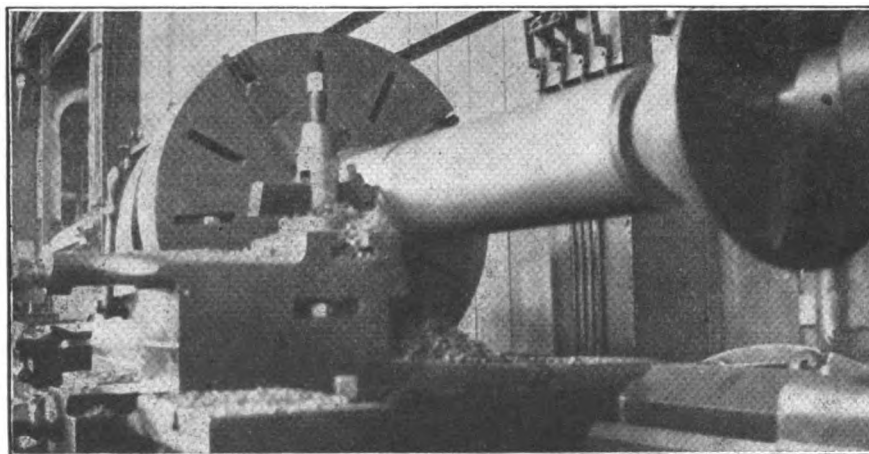


FIG. 9—THE TEST CYLINDER SET UP IN LATHE

Testing the Tools

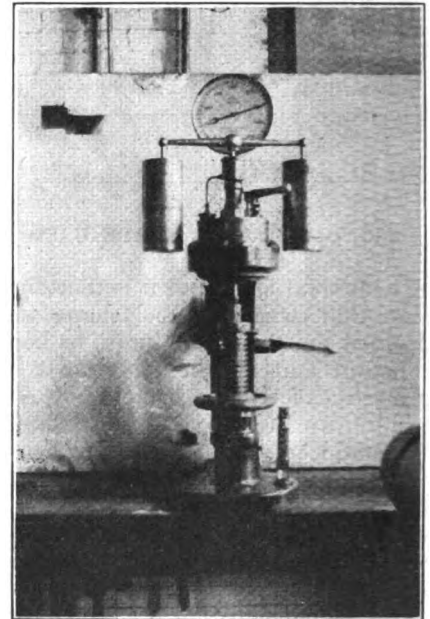
The tests were run at the "Standard Plunger Elevator Co." where we were allowed to use a 16-inch

F. E. Reed lathe which was driven by an eight-horse power, variable-speed motor. The test cylinders were held in the machine by means of a four-jawed chuck and pipe center. The scale was removed from the casting and the end of the cylinder squared so to get the good, clean iron for the testing of the tools. All the blow holes were turned out as far as possible.

It was found that the lathe had 18 speeds, three gear ratios of 6 motor speeds each. In this testing we used the highest gear speed and in most cases the highest motor speed also. It was decided to use a 1/8-inch depth of cut, on the radius, with a 1/32-inch feed, and then, keeping these conditions constant, note how the length of cut at a given surface speed varied for the different heat treatments. The tool holder was set up in the tool post of the lathe in such a way that the back angle of the tool was tangent to the plane of the pipe center in the lathe. The tools were all set to meet this requirement, and also care was taken to see that the points of all the tools were at the same height above the lathe ways. The tests of the tools were made by setting the feed, and depth of cut, then, when the tool started into the metal, a stop watch was punched, and a surface speed indicator applied to the casting just ahead of the tool. This surface speed indicator was nothing more than an ordinary revolution counter which had a wheel of 6-inch circumference attached to the spindle. The distance from the pipe center end of the casting to where the tool started its cut was measured. After the tool had broken down the

watch was again punched, the speed meter removed, and the length of cut measured. The point of break down of the tools was determined

by watching the tool and also observing the character of the surface cut. It was soon found that as the tool wore down and finally came to the breaking point that the surface of the cut had a shiny and straw colored appearance. This breaking-down point was very marked and could be found with a very fair degree of



THE BRINELL MACHINE USED TO TEST THE SPECIMENS FOR HARDNESS

accuracy. Fig. 9 and Fig. 10 show the set-up of the test cylinder in the lathe.

The results of the preliminary testing of the effect of secondary heat treatment are shown in the following table. Observe that this tool did not break down even under these conditions, but was just as good at the end of the test as it was before.

Analysis of the Results

It will be seen by referring to Table Number I that no results were obtained for the no-secondary heat treatment temperature that could be used as a standard with which to compare the other heat treatment temperatures; thus, in this preliminary test we can not say that secondary heat treatment improves the conditions although the tendency seems to be that way.

By reference to chart 1, it will be seen that for the tests on the "a" and "b" specimens that the duration of cut increases with the increase in secondary heat-treatment temperature until the 1200-degree mark is reached; after this the curve falls off again. The material on which the tests were run was gray cast-iron, and was not as uniform as

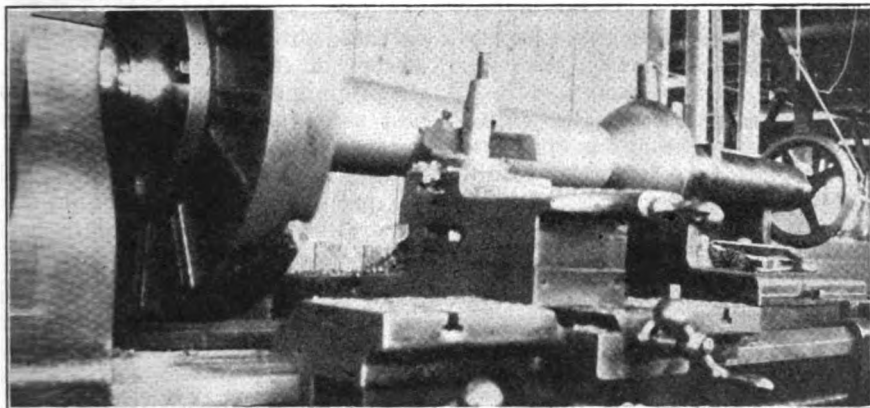


FIG. 10—ANOTHER VIEW OF THE ARRANGEMENT USED FOR TESTING THE TOOLS

we had hoped it would be. It was filled with hard spots and blow holes which greatly affected the results. It will be noted from the curves that the "c" specimen reached a maximum endurance at the 800-degree temperature, thus causing a discrepancy.

Conclusion to Preliminary Tests

No tests were run so that we could compare secondary heat-treatment results with no-secondary heat treatment, but the results we did obtain revealed that the best conditions were realized when the secondary

point of efficiency, we deemed it wise to run another set of tests to determine whether a temperature in the vicinity of 1200 or 800 degrees gives the better results. Also, attempt to get some results from specimens with no secondary heat treatment.

Second Testing of the Steel

The method of performing this test and the apparatus used was very similar to the preliminary test with a few exceptions.

The specimens were made out of two new bars, and were drawn down to the same cross section as previously used. We drew down the stock for the first test ourselves but as we were not very skilled in this kind of work, and since the steel had to be worked very carefully, it was decided to let the writer draw it down himself for the second test. In this way we were assured that the stock would be square and of uniform cross-section. The pieces were cut off to practically the same length as before, and were numbered and lettered to give seven secondary heats with three tools for each heat. The preliminary heat treatment was performed in the same manner as al-

ready described. Temperatures of 800, 900, 1000, 1100, 1200 and 1300 degrees were employed.

It was decided to use a different test specimen in this testing, one for which both time and surface speed would be variable. From the previous test we found that the log was not long enough to break down some of the tools, yet others broke down in so short a length that it was impossible to get a fair rating from them. The specimen which we did use is shown in Fig. 11.

Testing the Tools

The same lathe was used as in the previous test, the test plate being held in the four-jawed chuck. The face of the casting was squared up and the center hole bored out so that

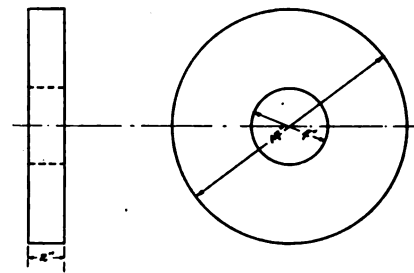


FIG. 11.—THE CAST-IRON TEST PLATE

a good grade of metal was obtained. A constant was obtained between the speed of the motor shaft and the speed of the spindle of the lathe in order to get the surface speed from the speed of the motor, since this was the most easily obtained. The tool was set up and fixed so as to give a 1/16-inch depth of cut, and a 1/56-inch feed. The cross feed was pulled into place, and when the tool started to cut, the stop watch was punched and the revolution counter was placed in the center of the motor shaft. The tool continued to travel from the inside hole to the outer sur-

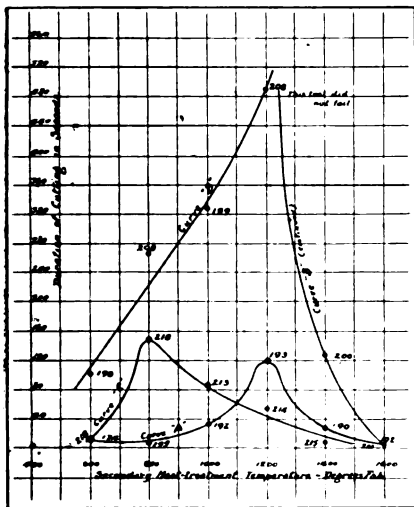


CHART NO. 1—THE FIGURES INDICATE THE CUTTING SPEEDS AT POINT OF FAILURE

heat-treatment temperature increased up to a certain value and then decreased again. For the steel that we used, for the conditions of preliminary heat treatment, feed, depth of cut, tool shape, and cast-iron used, we conclude that secondary heat treatment is a benefit to the cutting properties of the steel.

Owing to the fact that there was some discrepancy in the maximum

TABLE NO. 1.

Tool No.	Temp. of heat	Brinell hardness	Speed in ft./min.	Time in sec.	Depth of cut	Feed	Length of cut
1a	....	653	160	21	1/8"	1/22"	5/8"
2a	600°	601	174	12	"	1/38"	1/2"
3a	800°	555	195	10	"	"	7/16"
4a	1000°	555	192	36	"	"	1 1/4"
5a	1200°	555	193	119	"	"	5 1/2"
6a	1400°	555	190	25	"	"	1 1/8"
7a	1600°	302	192	3	"	"	.....
1b	....	635	....	....	"	1/22"	.....
2b	600°	601	198	195	"	1/36"	5 1/2"
3b	800°	555	208	265	"	"	12 1/2"
4b	1000°	555	189	327	"	"	15 1/8"
5b	1200°	555	203	486	"	"	22 1/4"
6b	1400°	534	200	125	"	"	5 5/8"
7b	1600°	331	201	4	"	"	.....
1c	....	653	101	190	"	1/22"	8 3/8"
2c	600°	601	218	10	"	1/36"	1/2"
3c	800°	555	218	146	"	"	6 3/4"
4c	1000°	555	213	90	"	"	4 1/2"
5c	1200°	555	214	53	"	"	2 3/4"
6c	1400°	514	215	4	"	"	.....
7c	1600°	262	215	3	"	"	.....



face of the plate; when the tool broke down, the stop watch was again punched and the revolution counter removed. The diameter from the cut, where the tool broke down, was measured and recorded; from this and the above data the surface speed at the point of break down was found. Care was used in determin-

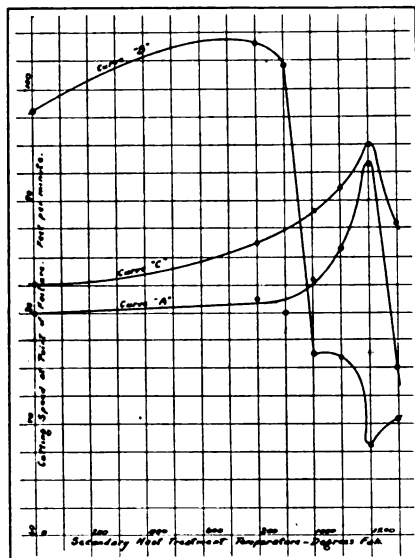


CHART NO. 2—CURVES SHOWING RELATION BETWEEN SECONDARY HEAT TREATMENT AND CUTTING SPEEDS AT POINT OF FAILURE

ing the breaking down point of the tool, also to keep everything as constant as possible. The feed was gear-driven to insure a positive drive.

Table Number 2, which follows, and Chart 2 show the results of this test:

Analysis of the Results

In the results obtained from this second test of the effects of secondary heat treatment on the cutting properties of high-speed steels show that secondary heat treatment is beneficial in obtaining the best properties of the steel. Here again, in this test, we got two tests, "a" and "c", which showed 1200 degrees to be the proper temperature to get the best results, and one test, "b", which showed 800 degrees to be the high point. In the case of the test on the "b" specimens it should be stated that the breaks in the curve were caused from the fact that in the middle of the test the casting used was found to be full of blow holes which very quickly ruin a tool. The casting was replaced by a new one, but this one was not much better owing to the hard spots present. For these reasons we do not consider this a fair test of "b"

specimens, and so feel that we are justified in discarding this test, and basing our conclusions on the other tests which we have made.

General Conclusions

We considered that for our work the test plate gave far better results than the cylinder, owing, perhaps, to the more uniform grade of metal that can be obtained in this specimen. We feel safe in concluding that secondary heat treatment does improve the cutting properties of high-speed steel, and, for the steel used with 2250 degrees for preliminary heat, that a secondary heat of 1200 degrees brings out these properties to the very best advantage. Whether it is worth while to spend the extra amount of money to obtain these results from secondary heat treatment is a problem which is yet unsolved. This problem depends a great deal on the circumstances, what would be profitable to one concern might not be for another. We are of the opinion, however, that if care is used to get the very best tool shape for the conditions of the material and the work that the tool is to perform that this is far more important than the secondary heat treatment of the steel.

We suggest that if this subject is further investigated that some sort of a rolled steel specimen of high-carbon content be used as a metal upon which to perform the tests, since with steel it is possible to get a very uniform grain and a structure free from blow holes and hard spots which quickly kill a tool. Numerous tests are made on cast-iron, and it is well to obtain all the data possible upon the machining of this metal,

ary heat treatment does improve the cutting properties of high-speed steel; that, for the steel we used and its preliminary heat treatment, the best secondary heat-treatment temperature is very close to 1200 degrees Fah.; that the obtainment of the proper tool shape is of greater importance than the secondary heat treatment; and, if this subject is further investigated, that a rolled steel specimen be used in preference to cast-iron.

The Hardening and Tempering of Steel

OWEN LINLEY, In "The English Mechanic"

High speed steels are now of enormous price, hard to obtain, and their treatment is above the means of the average amateur. It will also be noticed that in this article I do not give any degrees of temperature, because these would need a pyrometer, which, I take it, but few of my readers would possess, but I describe simple means of judging the heats by the eye. Now, the most important point about the successful hardening of carbon steel is to prevent over-heating it, and how this can be avoided I shall fully explain. If carbon steel is raised above a red heat, it becomes, in workshop language, "burnt," loses its strength, no matter how much it may be tempered, will not carry any cutting edge, and is generally useless; but it is not by any means as well known as it should be that steel can be injured by heating it far below the point of burning. But at a low heat, if the quenching liquid is right, all

TABLE NO. 2.

Tool No.	Temp. of heat	Brinell hardness	Speed in ft./min.	Time in sec.	Depth of cut	Feed	Inside dia.
1a	800°	653	80	208	1/16"	1/56"	4 3/8"
2a	800°	555	81	183	"	"	"
3a	900°	578	80	185	"	"	"
4a	1000°	555	82	204	"	"	"
5a	1100°	601	86	214	"	"	"
6a	1200°	601	93	269	"	"	"
7a	1300°	555	75	169	"	"	"
1b	800°	653	99	271	"	"	"
2b	800°	555	104	259	"	"	"
3b	900°	601	102	248	"	"	"
4b	1000°	555	76	133	"	"	"
5b	1100°	555	75	125	"	"	"
6b	1200°	555	68	96	"	"	"
7b	1300°	534	71	100	"	"	"
1c	800°	627	83	171	"	"	"
2c	800°	601	87	155	"	"	"
3c	900°	555	71	144	"	"	"
4c	1000°	555	89	204	"	"	"
5c	1100°	601	91	193	"	"	"
6c	1200°	555	95	197	"	"	"
7c	1300°	555	89	160	"	"	"

but, at the same time, we are sorry that we were obliged to use it rather than steel for our tests.

Finally, we conclude that second-

troubles of warping and cracking disappear.

The Source of Heat

A forge is best, next to this, a foot



blow-pipe, and, failing these, an ordinary domestic fire; but whatever means is used the steel should not be heated in a bright light, either gas or day light.

Many a beginner fondly imagines that he has got the steel at a certain heat, when seen in a bright light; but if it were viewed in darkness or semi-darkness it would be found to be much hotter. It is best to screen the source of heat with a piece of sheet iron or anything handy, so as when the work gets hot it can, as it is withdrawn from the fire, be viewed in semi-darkness. Having no means of representing color at my disposal, I can only do so by comparison. Some writers use the expression, "cherry red," but I think this term rather uncertain and too high, and would prefer to say "red brick" or red ochre, when the heated steel is viewed in semi-darkness. It is no use over-heating the steel and letting it cool down to the desired color, because the mischief is then done, and another point is that steel should be quenched on a rising and not a falling temperature.

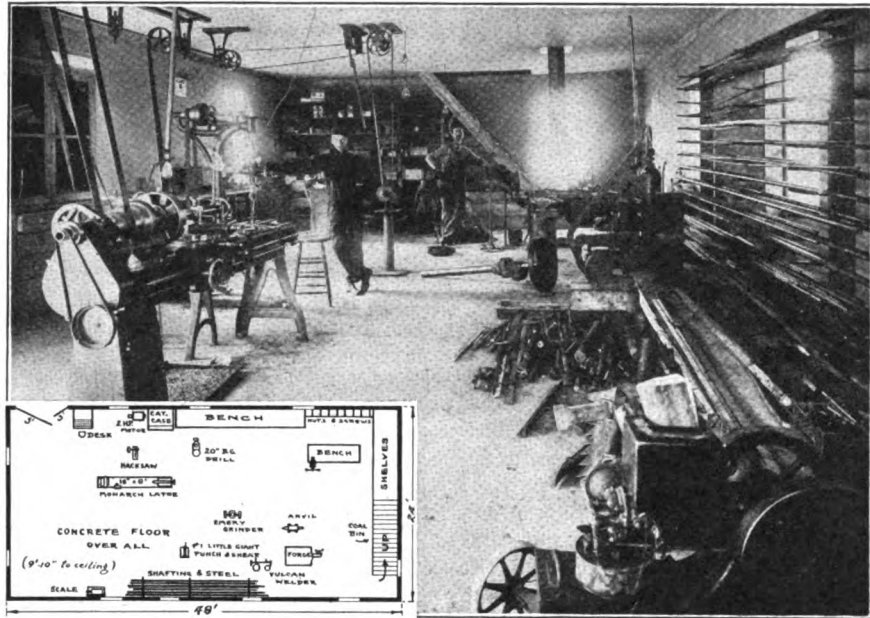
The Quenching of Water

This must be clean, as certain substances prevent the steel from hardening as it should; for instance, the smallest trace of soap is fatal. It is best, therefore, to use a new vessel. A large iron pail is as good as anything. A few handfuls of salt increase the bite of the water, and the common block salt is best, as some of the table salts of the non-caking kind seem to have something in them that is not desirable. The water improves by use, and should therefore be kept for this purpose only and not thrown away. Some steel workers, on starting a new vessel, make several large pieces of iron hot and quench them in it, the idea being to drive out the excess air and oxygen which prevent the water from coming in actual contact with the steel as quickly as it should.

It is also most important that the water should be quite cold, and the statements of some writers that the water should be warmed, or even have the chill taken off, is misleading, as this involves raising the heat of the steel above that at which it would harden if the water were quite cold. It is best to make a few trials to find out at how low a heat the steel will harden, keeping on the low side as to the heat and then raising it slightly if it is found on testing that it is not hard. When

the steel is judged to be of the right heat it should be dipped as quickly as possible when withdrawn from the fire, and moved up and down rapidly in the water, because at the low heat at which we are aiming the

they are very brittle and apt to break, and tempering increases their strength largely. Some turning and planing tools, especially for cast iron, can be left "dead hard," but taps, drills, reamers, screwing dies,



MR. J. E. ERICKSON'S BUSINESS-LIKE MINNESOTA SHOP. OBSERVE THE ORDERLY ARRANGEMENT OF EQUIPMENT, THE ABUNDANCE OF LIGHT AND GENERAL ATTRACTIVENESS. MR. ERICKSON USED THIS PHOTO ON CALENDARS WHICH HE SENT TO HIS TRADE

fluid seems at times somewhat reluctant to seize on the steel if the latter is merely dipped in it without disturbing it.

Testing the Steel for Hardness

After the steel has been dipped and allowed to get quite cold in the water, it should be tested in order to find out if it is really hard or not, as this is most important, for the steel must be quite hard; otherwise, if it were a tool, such as a tap, die, reamer, or anything of that kind, it would be damaged as soon as used. Now I will describe a very simple method within the reach of all. Dry the steel and place it in a vice, then take a 6-inch smooth file, hold it firmly in both hands, and force it slowly across the steel, using considerable pressure. On no account must the file be allowed to slip along the steel, as this might convey to the inexperienced reader the idea that the steel was hard when such was not the case. If the above operation is persevered with until it is found that it is impossible to make any impression on the steel, it may be taken for granted that it is hard.

Tempering Steel

For most purposes it is necessary to temper tools after hardening, for if left "dead hard," as it is termed,

etc., should be tempered. The methods of tempering vary somewhat, according to the article, but they mostly consist of brightening part of the article and applying heat. In manufacturing in a large way the degree of heat is often determined by some apparatus, but in a small way by the color of the oxide. Such articles as screwing or stamping dies, flat cutters, etc., are best tempered by placing them after polishing the upper surface, on a piece of sheet metal over a gas ring, or, if gas is not available, on a large piece of red-hot iron. The work must be watched carefully, and it is well to keep turning it round, end for end, as this prevents one end getting hotter than the other. Dies for screwing, stamping and such articles should be dipped when of a full straw color.

Taps, reamers and such articles are best tempered in a sand bath. A round tin pan should be filled with silver sand, heaped up and kept over a gas ring or a fire until quite hot, during which time it should be stirred often and mixed up well, so as to get it of an even heat. The sand should then be heaped up in the form of a cone or pyramid, so that the work can lay level in it, as if it



is pushed end down, that end will get hot first, and that is not desirable, the idea being to get an even heat. The work should be slightly moved about and rolled over in the sand, so as to heat it alike all over. It is well to rub a little tallow over the work with a piece of rag, as this prevents a kind of false oxide or color from appearing, which, otherwise, it does at times. The tempering should be done slowly, and it does the work no harm, if in doubt as to the correct color, to remove it from the sand to examine it, and even to let it get cool, and if it is then found to be of too light a color it can be re-heated until the required color is obtained. When tempering a top, or reamer, or tool, where the hardened part is of any length there is danger of one part getting soft before the other, and this is best avoided in the following manner:—Hold the work in a small pair of tongs, of a fair length, because pliers have a way of getting so hot that they cannot be handled. Hold the work so that it is at right angles to the tongs, and not in line with them, so that either end of the former can be dipped in water if it shows any sign of getting hot before the remainder. A pan full of water should be at hand for this purpose. Turning tools are hardened and tempered in one heat in workshop practice, but this requires a certain amount of dexterity. The tool is heated red for about an inch and a half up, and the end dipped for about half an inch until it is black. It is then withdrawn and rubbed bright, so that the effect of the heat from the part that is still red can be seen. When the end assumes a pale straw color it should be dipped. If any reader cannot manage this method, the best thing to do is to make the end of the tool dull red for about a quarter of an inch and dip it right out, then brighten the hardened part, heat the body of the tool, and watch the color as it appears.

How to Make a Cold Chisel

This is useful knowledge, because most of the ready-made chisels bought at tool shops are quite useless. The first step is to procure some chisel steel which is specially made for this purpose, and is of octagon section. It is but very little use trying to make a chisel out of square or round steel, as these sections are not of the right nature, and will not stand the shocks to which a chisel is exposed. The steel should be forged at a low red heat,

and care should be taken that it is not "galled" by the corner of the hammer or the edge of the anvil, as this may cause cracks, but it should not be hammered after it is black, though light hammering up to this point improves the steel.

When the chisel has been forged to the required shape the end should be finished by grinding or filing, and it should then be hardened and tempered. This should be done in one heat, as described in the first method of dealing with turning tools, but it can be hardened and tempered by the second. The edge of the chisel should be tempered to a deep plum color, verging on blue. The difficulty is that although the extreme edge may be of the correct tint, yet if the color is allowed to run down too fast the metal behind the edge will be too soft, will set under the shocks of the hammer and break. Then, again, if the color is allowed to run down too slowly, the metal behind the edge will be too hard, and pieces will break off bodily. The best way is to heat the chisel a very dull red for a good inch up from the edge, holding the tongs in the left hand and in the right a rub stone (a piece of broken grindstone or emery wheel, or, failing these, a slip of emery cloth wrapped round a small file). Dip the chisel for about half an inch until it just turns black, then withdrawing it from the water and letting it rest against the side of the pail, so as to steady it; rub it sharply with the stone, so as to brighten it, and watch the color as it runs down from the part which is still hot, and when the edge is of a deep plum color, verging on blue, dip it right out.

Editor's Note—We observe the following criticism of Mr. Linley's article which appeared in a later issue of "The English Mechanic":

With the many useful hints in the above article we are quite in agreement, but think the following paragraph of Mr. Linley's requires qualifying a little.

The paragraph refers to the quenching water, and reads as follows:—"It is also most important that the water should be quite cold, and the statements of some writers that the water should be warmed or even have the chill taken off are misleading, as this involves raising the heat of the steel above that at which it would harden if the water were quite cold. Most carbon tool steels harden when quenched in water at heats varying from 760 deg. to 800 deg. C., so that the variation of the temperature of the water by a few degrees could have no effect on the actual hardening. If the subsequent tempering effect is referred to, even the temperature required to temper to a pale yellow color is well above the boiling point of water; in fact, it is somewhere about 20 deg. C.

On the other hand, our experience, especially with the higher qualities of carbon tool steel, is that slightly warm water is less likely to cause cracking than very cold water. This is particularly the case when the design of the tool to be hardened is at all intricate.

Perhaps we might add a word of caution to another paragraph, in which Mr. Linley describes the hardening and tempering of a turning tool. He writes:—"The tool is heated red for about 1½ inches up, and then dipped for about ½-inch until it is black." The point we would emphasize is that the tool should not be held absolutely still in the water, as by so doing possibly a line of weakness may be formed across the nose of the tool owing to the different formation of the crystals. Keep the tool moving about.

R. G. Woodward,
Imperial Steel Works, Sheffield, Eng.

A Cathedral Gate of Rare Beauty

JOHN Y. DUNLOP

In the construction of those early churches in England, of which we have so many fine examples today, the bishops were not only presiding heads of their respective institutions, but architects and master builders as well, employing their own craftsmen—oftentimes for well nigh a lifetime.

The Chapel of Ely Cathedral, in which this illustration of the gate was made, was erected in 1520, Bishop West superintending the construction himself. It presents an exquisite example of the art of the old-time smith, who enhanced so much the beauty of these great ecclesiastical monuments.

Italian workmen are said to have contributed largely to the ornamentation of this building, and although the structure follows in general the English Gothic, there is an elaboration here and there of distinctly Italian motif.

The entrance is adorned with this beautiful large double gate, skilfully fashioned somewhat after the Flemish style. The name of Quentin Hatseys is usually associated with work of this character and age, and this example is indeed worthy of the reputation of the renowned artist in metal working.

The gate itself reveals many features foreign to the traditional work of England, both in ornamentation and construction. The arch filling is a most interesting portion of the composition with its charming and fanciful curves. The stems which fill this space are almost a full inch in



diameter at their maximum points and shaped in most harmonious order. The angular junctions of these stems have been of the utmost importance in adding to the general effect a bit of pleasing crispness. Where the stems expand themselves, they have been decorated with a flower on both sides which might be termed a pyramidal blossom.

The formation of the tracery at the frieze rail gives to the gate an unusually rich appearance. This part of the ornamentation is executed in three thicknesses. The center plate comes down and forms the cusps of a trefoil arch. The spandrels and plate on the face are slightly rounded on the outer arrise. The plate on the back is shaped with square corners.

The turst balusters from this rail extend downwards to the lock rail. Here they are received by tracery much similar in form but executed in only a single thickness. This lock rail is in four parts, the lower tracery being welded to the top moulded section. The lower rail is grooved for the front and back plates and ornamented with a turst ornamentation from end to end. The two fret rails form the back and front of the door.

In the building of these latter parts, the ornamental masses must have been cut out first and then riveted to the back section.

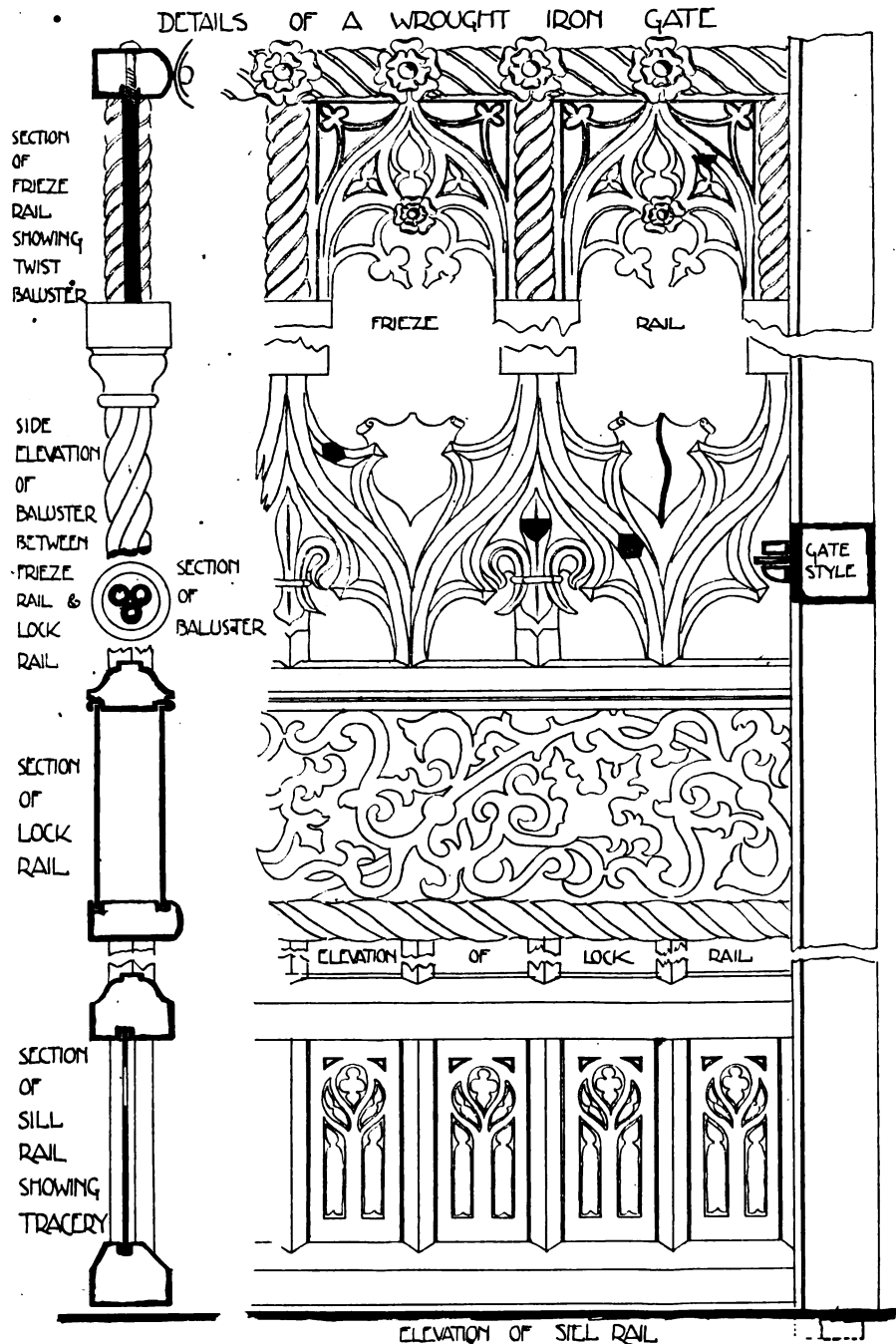
The thickness of the plate which forms the panel is about one-eighth of an inch. The stem projects at its greatest one-quarter of an inch.

Below the lock rails the balusters are set with their diagonals at right angles to the front of the gate. The sill is formed by two bars not unlike the lock rail, but the space intervening has a continuation of the balusters above which are welded to the bottom bar of the gate.

Each of those spaces formed by the two rails of the sill are grooved top and bottom to receive a tracery panel of about an eighth of an inch thick.

Where the panel meets the baluster it merely butts against it, but to stiffen the vertical edge of the panel it has been turned round at right angles and the inner corner set to form a cavetto moulding.

The arrangement of the whole design is very complete and the minute details which are worked out keeps the iron work in full harmony with its ornate surroundings.



Foot Angle for Draft Horses

A. L. CAMP

IF the feet are of acute angle all round, the horse will stand with his feet more under the body than if they were of normal angle. Also if the feet are high of heel, which gives an obtuse angle, the forefeet will assume a position forward and the hind ones backward of the normal or natural pose. And if the hind feet, in the first case, are made more upright and have to be posed further to the rear, the animal is forced into a strained position, or, in the second case, if the obtuse hind feet are reduced to an acute angle they are advanced naturally to effect perfect

equilibrium with also a strain on the animal. Therefore, both hind and front feet should be as near as possible, for ease in bearing the weight required.

It is logical that the foot angle should be of such degree that the animal's weight may be borne with the least exertion of the muscles controlling the parts involved. After many years of practical study of the living horse as well as anatomical research of the bony frame and the muscular system, I have arrived at a conclusion as to what constitutes a proper foot angle for the allowance of the joints of the fetlocks and legs to properly assume positions of ease.

Unlike other species of animals it is unnecessary for the horse to as-



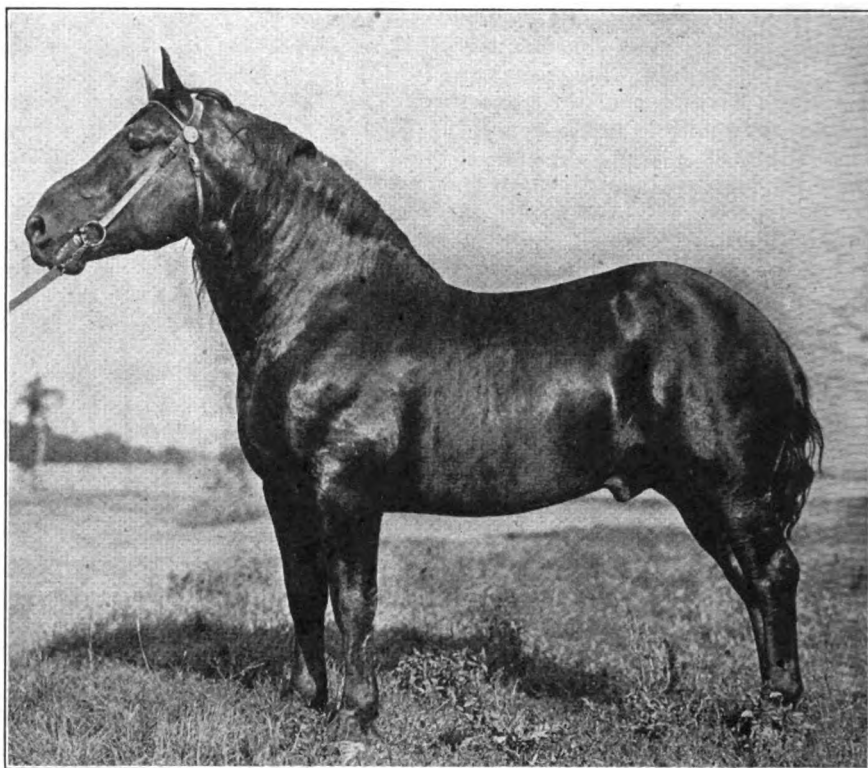
sume other than a standing position for sleep or rest. I have known many horses to go for days, weeks or months, although in active service, without lying down, and have heard of cases, and believe it true, where they have never, to human knowledge, lain down in a life-time. But these were sound animals and with the natural foot angle. Any unsound one, especially one with foot unsoundness, will pass much of its leisure in repose.

For harness horses, whose labor is principally locomotion, such as racing or road work where but little weight is drawn and the position of the legs assumes that of the undomesticated natural brother, I consider a 45-degree angle the ideal; for such angle alone allows the joints to fit and so lock that no strain whatever is thrown on the muscles in the support of its weight. This enables the animal to rest without effort and also, when in action, to flex and return to position with a minimum expenditure of energy of the locomotive parts.

But, as all horses are not used for the above work, the pose required must differ. For instance, the saddler or pack horse to be equal to the demands made upon it should have its legs more under-all or the spine cannot arch upward to form the resisting truss so vitally essential. If one will observe cavalry or the western cow-horses—horses whose sole occupation is weight bearing, it will be noted how extremely close in comparison their fore and hind feet are together.

It is true that in the saddle horse show-ring the demand is for the fancy or gaited saddler to pose with legs well to the front or back; but in their cases the demand for their labor is of short duration and the strain can be borne but such animals would be entirely out of place, and would certainly fall by the wayside were they asked to carry the load of the cavalry or cow-horse the number of hours required. Therefore no horse used for weight bearing should have other than low or acute angled feet.

If a horse be stood on sets of scales, with his fore feet on one and the hind feet on the other with the head held about normal for height, and the scales balanced, it will be seen that when the head is raised more weight will fall on the rear scales and less on the forward and vice versa. A drafter when given head liberty always puts the head forward and low, and throws all the



WHAT MORE BEAUTIFUL CREATURE IS THERE THAN THE PERFECTLY FORMED, GLOSSY-COATED DRAFT ANIMAL? THE HORSESHOER PLAYS A MOST VITAL PART IN KEEPING HIM FIT AND IT BEHOOVES EVERY MEMBER OF THE CRAFT TO BE EVER WATCHFUL OF HIS NEEDS

weight possible onto the fore-parts. By so doing it can pull a heavier load and do it easier. To assume this low-headed pose and the ability to lean forward and throw the weight in the collar, depends largely on the foot angle. The fore feet must be able to set well back and under, therefore they should be low of heel or acute of angle. It is better to have a toe calk and no heel ones. This allows the feet to assume the proper pose and the toe calk gets a hold without slipping. The hind feet should be of higher heel and shorter toe and set more steeply. This causes them to stand well to the rear. By so shaping the feet the animal stands in the pulling pose and ready, without undue exertion, to move the load. If calks are used on the hind feet, which is almost imperative, the heel ones are all that are required.

A 1,200-pound trotting gelding that I own came to the stage in life when he was outclassed and unprofitable for racing purposes and was broken in to farm work last spring. I made no change in the foot shape until he had worked for some days. The work was exceedingly hard for him as he seemed to "work against himself" and after pulling the plow and sweating profusely and being stopped, would lift and set

down the hind feet a number of times before "finding a place that would fit them." On changing the foot angles as advocated above for drafters, he did the work with comparative ease, and on stopping, stood still and firmly in his tracks.

A check rein that holds the head in any position is detrimental to any line of work, but more so in the case of draft horses. They should have free play for the head that suitable positions may be taken when standing, moving or pulling. Even the driver or runner that starts away with head up and muscles tense, with strength and undepleted energy, will, before the goal is reached, lower the head upon the outstretched neck. If an overcheck is holding the head up the animal will not finish nearly so strong.

Canker and Thrush

Two Common Conditions Affecting the Horses' Feet Which are Closely Associated But are Two Distinct Diseases

CANKER is a chronic diseased condition of the membranes directly under the horn, frog and sole due to the rapid reproduction of a vegetable parasite. The diseased condition starts at the frog and extends to the sole and wall. It



not only destroys the sole and wall, but sets up a chronic inflammation in the deeper tissues thereby destroying the normal function of the horn's secretive cells and preventing the injury being repaired.

Predisposing Causes—Standing animals in continued dampness especially in unclean stables where there is no drainage and animals standing in manure and water. Injury to the feet which allow the entrance of a causative parasite.

For unknown reasons animals with thick skins, heavy hair, fleshy frogs, and flat feet are especially liable to canker.

Exciting Causes—This disease is caused by a parasite that grows rapidly in filth and is of vegetable origin. It is often transmitted from one animal to another when they stand together.

Symptoms—Canker usually is confined to one foot at first but later spreads to the other feet and all four feet may become affected.

In the early stages there is no lameness noticeable, but later the foot becomes sensitive especially on rough roads and finally when sole and frog are largely destroyed there is a severe lameness.

When the disease follows an injury the wound does not heal and there is a profuse, thin, watery, fetid discharge. This discharge has a very offensive odor and undermines and destroys the surrounding horn. The under tissues are dark colored, swollen and in some parts covered with a soft yellowish horn which is immersed in the secretion and constantly undergoing disintegration. This secretion dries on the surrounding parts and forms cheesy masses of horny matter. When the disease is not from an injury there is first noticed a very offensive odor of the foot, liquid secretion from the sides and cleft of the frog and rotting away of the horn of the frog and also of the sole.

Treatment—The treatment of this disease is very unsatisfactory in its results.

All horn that is undermined by the fetid secretion should be removed. Apply oakum soaked in a 10% solution of formaldehyde held in place by moderate pressure. Keep all growths trimmed down well and a new formaldehyde pack should be applied once every other day.

THRUSH is a disease of the frog characterized by a discharge from it of a black and offensive pus and accompanied by more or less wasting of the organ. It is more

often seen in the common draft horse than in any other breed, due to the conditions of servitude and not the fault of the breed. It is more often seen in the horses used on streets in towns than those used in the country.

Causes—The most common cause of thrush is the filthy condition of the stable where the animal is kept. Hard work on rough and stony roads may also induce the disease as may the change from dryness to excessive moisture. Muddy streets and roads excite this abnormal condition of the frog. Contracted heels, scratches and navicular diseases are predisposing causes of thrush. Mares are more liable to contract the disease in the hind feet when the cause is filth, while the gelding and stallion are more likely to develop it in the forefeet.

Symptoms—The first symptom noticed, unless the horseman is a very careful observer, will be a very offensive odor from the foot. On examination there is simply an increased moisture in the cleft of the frog accompanied by the offensive smell. Later there is considerable discharge which at first is thin, watery and highly offensive, changing to a thick puriform matter which rapidly destroys the horn of the frog. This disease rarely produces lameness, but may when the whole frog is involved in the diseased process.

Treatment—The cleft of the frog should be pared out and all diseased tissue eliminated. A small piece of absorbent cotton or okum should be saturated with a 10% solution of formaldehyde and packed around the frog. Do not bandage. This should be dressed once a day in the same manner for three days, then every other day for three treatments.

This is all the treatment that will be required.



Odd Mention of Anvil Ringers and Knights of the Forge in the News of the Day Fears Son, a Blacksmith, is Too Delicate For War.

Fearing the rigors of warfare would be too much for her delicate blacksmith son, a woman living at Fresno, Cal., has written to United States marine corps headquarters here, asking that the young man be discharged.

"He is too weak and delicate to be in

the service," she wrote. "He is a blacksmith's helper by trade, and I would prefer him to stay at his last job."

The mother was informed that, for the time being her son must remain a marine.

Blacksmiths Get Diplomas.

The first class of the blacksmiths' school at the remount station at Camp Sevier, South Carolina, numbering about sixty members, has been graduated. It is probable that another class will be organized shortly.

Blacksmiths Reap Harvest.

As Snow and Ice Gives Stimulus to Business.

This cold weather may be hard on the noses, ears, fingers, toes and general constitutions as well as tempers of nearly every one, but there's one class of tradesmen who do not mind it. That's the blacksmiths. This snow and ice which seems to be prevalent throughout the country, is worth its weight—well, hardly in gold—but just the same it's mighty profitable to the wielder of the sledge upon the flaming metal.

The slippery streets are generally almost impassable for horses, unless they are sharp shod. Now the points or horse-shoes, soon wear off on the pavings, and during the summer, these are not renewed. The fall has been so warm and fair that there has been no occasion to have the horses reshod, and the ice and snow of the past few weeks has come as a surprise to the owners of horses.

Naval Reserves Need Skilled Mechanics.

The naval reserves want at once volunteers who are skilled mechanics. Men with trades who want to serve their country and still work at their trade with probably better pay than before can enlist in the reserves at once. The age limit in this branch of the service is from 18 to 40 years and the chances of promotion was never better than now. In the last two days six men who had enlisted as seamen, second class, and up to petty officers, have been commissioned as ensigns, at the local office.

Aviation mechanics of all kinds, copper-smiths, blacksmiths, carpenters' mates and architects, are especially wanted. Men able to superintend construction work and men with a fair education have an excellent opportunity for honor and promotion in the service.

Those who have felt that they wanted to serve their country but who held off because of dependents need not do this as the pay, allowances and the insurance against injury will in most cases greatly exceed the wages of the craftsmen in the city.

One branch which should appeal especially is the gas engine branch.

Iowa Horseshoers Hold Annual Election.

The following officers were elected for 1918 by Local Union No. 47 of the International Union of Journeymen Horse-shoers:

President, F. J. Boudewyns; vice president, Harry Wilson; treasurer, S. J. Robinson; financial secretary, Charles Hartman; corresponding secretary, Harry Morgan; recording secretary, John French; sergeant-at-arms, Charles Van Hauton.

Knows His Blackstone as Well as His Forge.

Charles A. Kelso, aged forty-four is a blacksmith as well as a lawyer. He has been a blacksmith for twenty-three years. In 1915 he was graduated from the University of Maryland and took up the practice of law in addition to his other work.



The Army Mule

The army mule, the army mule,
He is a patient cuss,
It's almost unbelievable
The stuff he totes for us.
The pack he carries on his back
May like the Jungfrau soar,
But there is always room for just
One pan or bundle more.

Our autos with a snort of scorn
Pass by him on the road;
To haul them later from the mud
He often drops his load.
Though gas gives out and motors stop
And wagons lose their wheels,
No power but death can halt the swift
Machinery of his heels.

He's going o'er the sea with us,
The soldier's faithful friend,
To do his humble part in France
Until the war shall end.
Who knows but that some day he may
Be Fate's unconscious tool,
And kick the Kaiser off the earth,
The good old army mule!

MINNA IRVING in the Sun.



Heats, Sparks, Welds

Sent in that shop picture of yours yet?
Don't write your good wishes with in-
visible ink—use indelible.

There is only one trade that can be
justified in giving cut rates—barbers.

The Americans don't know exactly how
the war started, but they know how it's
going to end.

You can't make some smiths believe
that bankruptcy is too high a price to pay
for price cutting.

"The Cashdollar Grocery in Sparta,
Tenn., has had to suspend business be-
cause it sold too much on credit." That's
the way it usually works out, even in the
blacksmith shop.

Remember those boys in France are
OUR boys and YOUR boys. Do your bit
in saving food and they will get their
bite, and while we think about it—how
many War Saving Stamps have you
bought?

The things that one can learn by proper
use of his spare time are simply astonish-
ing. If one has a fixed purpose steadily
in mind and devotes all the time he can
preparing for it, even if it is only a few
minutes every day, the results will be very
gratifying. Surprising as it may seem,
the best results are obtained usually by
the busiest people, because such people

know the value of time and how to use
it to good advantage.

Edwin F. Geers, better known perhaps
as "Pop", the famous driver of harness
horses who is now 58 years old, thirty of
which have been spent in the development
of pacers and trotters, in speaking about
the selection of horses for track purposes
says:

"The only way to pick a horse is just
the way you would pick a friend. Beauty
doesn't count. You look at him square in
the face, and if he has a good head, full
face, a fine eye and a good matured ear,
he is all right. If he looks like a convict,
let him alone."

Without batting an eye or cracking a
smile, congress had placed before it just
a few days ago, a bill that had for its
stern purpose that of preventing anybody
from selling the new government bond
issues below par. Translated into "plain
United States" this is Uncle Sam's move
to squelch the price cutters of his new pet
specialty.

Congress probably didn't see the joke
and probably never will, but with Uncle
Sam going into business more and more
and endeavoring to sell war bonds to mil-
lions of customers, who have never
bought from him before, he is facing a
distribution and merchandise problem—
with its inevitable price-cutting accom-
paniment.

Uncle Sam knows that price cutting is
purely a pirate game, destructive of good
sense, economy and individual enterprise
and he is protecting himself as he very
properly should.

Send along an article on that short cut
of yours for doing a hard job. We'll be
just as glad to print it as your fellow
craftsman will be to read it and don't
forget to send along a rough sketch, or
better still, a photograph.

Even Uncle Sam is getting after the
farmers and trying to get them to fix up
their broken down machinery in prepara-
tion for the work that is in store for
them. With all the boosting that this
matter is getting from the farm journals
and other sources the blacksmith should
get his share of it.

The best rewards generally come to
those persons who are best trained. If
we wish to be thoroughly successful in
any line of work, we must prepare for it;
we must know more about it than others
do. This knowledge can best be obtained
by regular, systematic study. Haphazard
study and general observation seldom car-
ries one very far up the ladder of success.

Light promotes efficiency; therefore,
have as much light as you possibly can in
your shop even if you have to cut another
window or so. The improvement in the
appearance of your shop will be well
worth the time and expense.

To do just a little more than is expect-
ed of you, whenever it is possible, is about
all that anyone can do toward getting
ahead in the game of life.

Ever stop to think of the useful things
that can be made from small angle iron,
rivets and plates—for instance, tool racks,
stock racks, tables, chairs, machinery
guards, holder or cart for acetylene tanks,
etc?

We haven't received that picture of
YOUR shop yet. Send it along with a
description of it and the first time we
meet, the editor will buy—ah-uh—a Coca
cola.

"I am more than pleased with my in-
vestment of \$1 one year ago, as I have

Proverbs of Solumn

VERILY pride goeth before
a fall; but the pride a
smith taketh in his work goeth
not thusly but yieldeth much
in the way of satisfaction and
profit.

He that harkeneth to the hot
air of the deadbeat is like unto
him who picketh up a piece of
hot iron. Verily, he shall be
scorched.

Woe unto the smith who
cutteth prices. For when he
drowneth in his own profitless
sweat and grabbeth at some-
thing wherewith to keep his
head above water, his fingers
shall be swatted with a ham-
mer.

—Will Bishop

gotten many times the cost out of it,"
says Thomas W. Miller of Pennsylvania.

Modesty being the badge of all our tribe
Mr. Miller's letter gives us a chance to
tell what we think about it ourselves.

You can't keep a good thermometer
down—nor a good man.

Start now to do a little missionary
work toward getting the farmers to bring
in their machinery repairs before the first
warm days come.

Draft the loafers—It may be hard to
make men of 'em but the army is equal
to most anything.

Hang up a new sign or have the old one
repainted and don't be afraid that people
will scare at the sight of your name thus
displayed.

"Initiative consists in doing on the spot
without being told and without complain-
ing, what the other fellow never thought
of doing."

Ever think what might happen if one of
your customers would stop a deluge of
horse-shoes that had severed diplomatic
relations with their pegs on the ceiling
joists?

It takes a mighty fair-minded man to
admit that a man who doesn't agree with
him might be right.

Efficiency counts even with the furnace
man. He may get up steam or he may be
a hot air artist.

A bottle of iodine is a mighty useful
thing to keep about the shop at all times.
Don't be afraid to use it on any cut that
you get.

Think of this the next time you hear
any rumors about the Y. M. C. A., the
Red Cross or any other agency engaged in
a good work—"All slander must be
strangled at its birth or time will soon
conspire to make it strong enough to
overcome the truth."

If you are interested in new equipment,
need supplies or want any information
concerning advertised articles write to the
Subscribers' Service department.

Some of the boys are sending in their
ideas at last. Look over "Queries, Answers,
Notes" this month and note the number of
letters. This, Reader, is our most import-
ant section of the paper—the part where
you can express what you think, the de-
partment through which brother crafts-
men can exchange ideas and be of genuine
help to one another. Better get busy your-
self if you have not yet contributed and
let the Editor have something today.



Our Honor Roll

AND STILL THEY COME

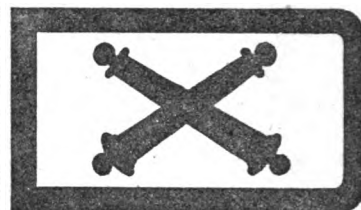
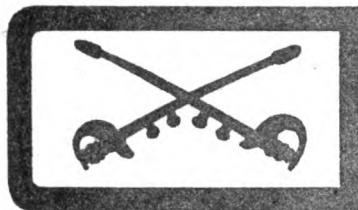
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M. Goller, Pa.	Feb., 1927	W. L. Berthoff, N. J.	Oct., 1924
A. A. McLean, Nev.	Feb., 1927	J. W. Hewson, S. Africa	Sept., 1924
C. M. Adams, Conn.	Jan., 1927	Ed. Larson, N. D.	Sept., 1924
C. Radelet, Iowa	Jan., 1927	R. T. Monk, Illinois	Sept., 1924
P. J. Kauth, Ill.	Dec., 1926	W. T. De Young, Illinois	Sept., 1924
A. H. Gooding, S. Aust.	Dec., 1926	C. W. Taylor, Pa.	Aug., 1924
A. Gramadam, Ill.	Dec., 1926	Charles Wells, Colorado	Aug., 1924
C. J. Hale, Wash.	Dec., 1926	H. G. Weaver, Pa.	Aug., 1924
John H. Schneider, Cal.	Dec., 1926	Working Men's College, Viet.	June, 1924
J. C. Smith, Washington	Dec., 1926	F. M. Kenoyer, Nebr.	June, 1924
H. Grimm, Utah	Dec., 1926	O. Anderson, Ariz.	May, 1924
F. Harding, Iowa	Dec., 1926	R. C. Frederick, N. D.	May, 1924
F. L. Matlocks, Ark.	Sept., 1926	H. L. Fenton, New Mexico	May, 1924
E. B. Jones, Wisc.	Sept., 1926	J. Carl, Iowa	May, 1924
J. Taylor, Calif.	Oct., 1926	J. E. Little, Pa.	May, 1924
W. H. Branch, N. C.	Oct., 1926	H. I. Brenzie, N. Y.	Apr., 1924
J. Clarke, Jr., Queens, Aust.	Aug., 1926	W. E. Parr, Iowa	Apr., 1924
I. Boles, Ohio	July, 1926	F. Sramek, Nebr.	Apr., 1924
J. A. Buchner, Mich.	July, 1926	L. A. Hulén, Calif.	Apr., 1924
H. Mitchell, N. Y.	July, 1926	J. Sparks, Va.	Mar., 1924
M. Broton, N. D.	June, 1926	J. E. Ray, Minn.	Mar., 1924
A. Schmitt, Nebr.	June, 1926	A. Hulstrand, N. D.	Mar., 1924
D. Ackland & Son, Man.	May, 1926	P. F. Selbert, Calif.	Mar., 1924
H. Pirret, Ore.	May, 1926	H. Roeschewetter, Mo.	Mar., 1924
J. Sinclair, W. Australia	May, 1926	W. B. Briant, N. J.	Mar., 1924
P. Stewa, Oregon	May, 1926	A. Bosch, N. Y.	Mar., 1924
E. P. Dignan, S. Australia	Apr., 1926	D. Van Valkenburg, Mass.	Feb., 1924
A. Peterson, Iowa	Apr., 1926	A. R. Johnson, E. I.	Feb., 1924
G. F. Bowers, Okla.	Apr., 1926	F. Jacobs, Ohio	Feb., 1924
W. Pochelu, Oregon	Mar., 1926	A. J. Ferry, Illinois	Jan., 1924
A. Garver, Ohio	Feb., 1926	E. K. Walker, Calif.	Jan., 1924
C. Burton, Mass.	Mar., 1926	H. D. Erskine, Vermont	Jan., 1924
J. Murphy, Calif.	Jan., 1926	E. Fowler, Pa.	Jan., 1924
J. F. Murphy, Nev.	Jan., 1926	Breen & Son, Ireland	Dec., 1923
F. Kearnes, Illinois	Jan., 1926	M. Lamoreaux, Ohio	Dec., 1923
J. N. McIntire, Pa.	Jan., 1926	R. D. Davis, N. Y.	Dec., 1923
W. Post, N. Y.	Jan., 1926	F. W. Copeland, Kansas	Dec., 1923
Powell Brothers & Whitaker, Eng-land	Jan., 1926	J. L. Tomlin, Kansas	Dec., 1923
O. Temple, Idaho	Jan., 1926	H. A. Davis, N. Y.	Dec., 1923
N. Karolewicz, S. Dak.	Jan., 1926	E. H. Troyke, Illinois	Dec., 1923
E. L. Lalin, N. Y.	Dec., 1925	D. B. Johnson, Iowa	Dec., 1923
J. A. Hulvey, Illinois	Dec., 1925	J. M. Karer, Ohio	Feb., 1923
Williams & Turner, W. Va.	Dec., 1925	S. Horton, Calif.	Nov., 1923
J. J. Devine, N. J.	Dec., 1925	J. Spratt, Mass.	Nov., 1923
P. Nelson, Minn.	Dec., 1925	F. Watkins, N. H.	Nov., 1923
M. Kennedy, Tas., Australia	Dec., 1925	F. Koppnis, Ala.	Nov., 1923
H. Jones, England	Dec., 1925	Y. C. Lienert, S. Australia	Oct., 1923
A. J. Wassmuts, Idaho	Nov., 1925	W. B. Abell, N. Y.	Oct., 1923

NAME	Subscription Paid to	NAME	Subscription Paid to
A. J. Brookman & Co., Vict.	Sept., 1923	G. F. Johnson, Michigan	Feb., 1922
W. R. Turner, Man.	Oct., 1923	J. Schoenberger, Ohio	Jan., 1922
C. Nelson, Nebr.	Sept., 1923	A. Burgett, Pa.	Jan., 1922
J. Hughes, Ohio	Aug., 1923	R. H. Keith, Iowa	Jan., 1922
H. M. Anderfuren, Calif.	Aug., 1923	W. Parks, Ohio	Jan., 1922
Camp Brothers, Texas	Aug., 1923	O. Danneman, Minn.	Jan., 1922
L. C. Larson, Iowa	July, 1923	O. Stenning, S. D.	Jan., 1922
S. Efenar, South Africa	July, 1923	W. Claffey, Illinois	Jan., 1922
G. L. DeWitt, Mont.	July, 1923	T. Cogley, Ireland	Jan., 1922
W. W. Gregg, Texas	July, 1923	J. Wedwick, N. D.	Dec., 1921
W. R. Stroupe, N. C.	July, 1923	J. Williams, Australia	Dec., 1921
O. C. Young, Michigan	June, 1923	J. J. Kilma, Nebr.	Dec., 1921
Otto Sippel, Pa.	June, 1923	J. Boyer, Mich.	Dec., 1921
A. Chapman, N. Y.	June, 1923	C. F. Shaw, Man. Can.	Dec., 1921
C. Birely, Md.	June, 1923	W. Blaker, Ohio	Dec., 1921
F. H. Shupe, Pa.	June, 1923	W. Lamberton, N. Y.	Dec., 1921
J. C. Storer, Pa.	Apr., 1923	Schedley & Schmitt, Pa.	Dec., 1921
W. Schoonover, Pa.	Apr., 1923	O. Furry, Kans.	Dec., 1921
J. M. Rumire, Iowa	May, 1923	E. A. Pierson, Okla.	Dec., 1921
Lansdale Brothers, Mo.	Mar., 1923	J. Robertson, Scot.	Dec., 1921
J. Carswell, Ark.	Mar., 1923	J. Lauer, Mo.	Dec., 1921
G. E. Glawer, Ohio	Mar., 1923	A. Brause, Ohio	Dec., 1921
F. Gath & Co., S. Africa	Mar., 1923	J. McArdle, N. Y.	Dec., 1921
T. Bradley, N. S. Wales	Mar., 1923	B. A. Abbey, Ohio	Dec., 1921
L. T. Needham, Illinois	Feb., 1923	J. Ingvarson, Minn.	Dec., 1921
G. C. Disinger, Miss.	Feb., 1923	A. F. Millebrandt, Mich.	Dec., 1921
J. Molitor, Ill.	Feb., 1923	J. H. Teufel, Jr., Illinois	Dec., 1921
I. Wieber, Minn.	Jan., 1923	R. C. Brown, Mo.	Dec., 1921
Z. A. Enos, Minn.	Jan., 1923	C. Eyer, N. D.	Dec., 1921
W. G. Wise, Calif.	Jan., 1923	G. Nichols, Okla.	Dec., 1921
F. S. Bishop, South Africa	Jan., 1923	F. H. Joslin, Mass.	Dec., 1921
F. S. Bishop, South Africa	Jan., 1923	J. B. Scheidler, Indiana	Dec., 1921
I. Curran, Arizona	Jan., 1923	J. H. Ickes, Pa.	Dec., 1921
C. Kling, Wisc.	Jan., 1923	E. Willis, Colorado	Dec., 1921
D. Foley, Calif.	Jan., 1923	J. W. Gorton, Ark.	Nov., 1921
S. P. Harney, Mont.	Dec., 1922	A. Ellicott, England	Nov., 1921
W. Breckner, Okla.	Dec., 1922	J. Beam, N. J.	Nov., 1921
J. Pahina, Nebr.	Dec., 1922	F. Kolarik, Iowa	Nov., 1921
A. Jones, Nebr.	Dec., 1922	A. McNab, Scotland	Nov., 1921
E. Mendenhall, N. C.	Dec., 1922	J. Delane, Nebr.	Nov., 1921
W. Etter, Mo.	Dec., 1922	A. Marks, N. S. W., Aust.	Nov., 1921
C. Beggs, Alaska	Dec., 1922	O. R. Stevenson, Ill.	Nov., 1921
I. H. Mess, Aust.	Dec., 1922	J. Meier, Minn.	Nov., 1921
M. Hewitson, Idaho	Nov., 1922	H. Schroeder, Mich.	Nov., 1921
E. H. Hoese, Texas	Nov., 1922	G. Booze, La.	Oct., 1921
T. Ziegler, Wisc.	Nov., 1922	J. O. Altink, Aust.	Oct., 1921
J. Gold, Alta., Can.	Nov., 1922	W. Knouff, Ala.	Oct., 1921
B. A. Steink, Ohio	Nov., 1922	O. M. Johnson, Miss.	Oct., 1921
A. Cleland, Ont.	Nov., 1922	J. K. Glinki, Mich.	Sept., 1921
Shepard & Son, N. Y.	Nov., 1922	H. Feldus, Nebr.	Sept., 1921
P. Fredericksen, Iowa	Nov., 1922	R. Murray, Calif.	Sept., 1921
L. O. Lewis, Illinois	Nov., 1922	A. Hammond, Calif.	Sept., 1921
S. Lawson, New Zealand	Nov., 1922	P. Wedel, Kans.	Sept., 1921
S. Shields, Kans.	Oct., 1922	J. Ackerman, Indiana	Sept., 1921
W. O. Grant, Calif.	Oct., 1922	A. Harper, Mont.	Aug., 1921
W. H. Miller, Iowa	Oct., 1922	L. E. Bonton, Pa.	Aug., 1921
I. Sproul, Me.	Sept., 1922	C. Pearce, Australia	July, 1921
J. S. Lee, Wash.	Sept., 1922	A. Watson, S. Africa	July, 1921
A. O. Martin, Idaho	Sept., 1922	R. Goldschagg, S. Africa	July, 1921
O. A. Mortimer, Idaho	Sept., 1922	C. Hammerstram, Minn.	July, 1921
H. J. Hyatt, Washington	Sept., 1922	A. S. Pratt, New York	July, 1921
J. N. Skow, Iowa	Sept., 1922	E. H. Spain, Ariz.	July, 1921
D. A. Standford, Washington	Sept., 1922	L. H. Strange, Vist., Aust.	July, 1921
T. Temkiewicz, Quebec	Sept., 1922	T. Watson, Aust.	June, 1921
J. Staub, Ohio	Sept., 1922	W. Urquhart, New Zealand	June, 1921
Clark & Fauset, Aust.	Aug., 1922	W. Voigt, S. Africa	June, 1921
A. Peliffer, Ohio	Aug., 1922	J. M. Werl, Pa.	June, 1921
W. D. Valentine, Iowa	Aug., 1922	E. Toll, New Zealand	June, 1921
A. Pittenger, Ill.	Aug., 1922	J. Devers, Ohio	June, 1921
R. Mattox, Va.	Aug., 1922	W. K. Bell, Ark.	May, 1921
H. Deronshire, N. Z.	July, 1922	A. Guettler, Texas	May, 1921
E. T. Cull, Ky.	July, 1922	G. Johnson, Kans.	May, 1921
G. Hofman, N. Y.	July, 1922	S. Budds, New Guinea	May, 1921
J. Erman, Ark.	July, 1922	H. Baker, Australia	May, 1921
G. Cortrell, Minn.	June, 1922	F. E. Smith, Vermont	May, 1921
W. R. Gelling, Australia	June, 1922	A. J. Hatch, Maine	May, 1921
W. K. W. Hansen, Pa.	June, 1922	W. Cornwell, Pa.	May, 1921
Robert Tochter, Calif.	June, 1922	W. F. Kline, Kansas	May, 1921
J. Van Marter, N. Y.	June, 1922	J. Kirkbride, N. J.	May, 1921
J. T. Brahm, Iowa	June, 1922	Thos. McNeill, Scotland	May, 1921
A. Olson, Minnesota	June, 1922	T. Holloway, Kans.	Apr., 1921
Otis Alman, Mich.	June, 1922	W. Winget, Vt.	Apr., 1921
J. Lamb, Idaho	June, 1922	D. H. Laird, N. D.	Apr., 1921
E. Schnelle, Ohio	Apr., 1922	A. J. Prue, N. Y.	Apr., 1921
J. Bunker, Iowa	Jan., 1922	C. A. Butler, Ohio	Apr., 1921
F. Norrie, Yukon Ty.	Jan., 1922	E. Moesner, Queens, Australia	Apr., 1921
J. Needham, Kans.	May, 1922	J. Laux, Oklahoma	Apr., 1921
E. Anders & Son, S. Aust.	May, 1922	C. L. Cease, Pa.	Apr., 1921
Louisa Carriage Works, Va.	May, 1922	E. Lindblad, Nebr.	Mar., 1921
S. Wilkin & Sons, N. Y.	Apr., 1922	F. Bowen, N. Y.	Mar., 1921
R. H. Kuhrt, Iowa	Apr., 1922	W. F. Tippey, Mich.	Mar., 1921
S. Smith, Texas	Apr., 1922	J. T. Rehm & Son, N. Y.	Mar., 1921
E. Burrows, Eng.	Apr., 1922	W. C. LeBow, Mo.	Mar., 1921
A. J. Neill, Vt.	Mar., 1922	William Pate, Mo.	Mar., 1921
W. Muckle, Ontario	Mar., 1922	A. T. Jameson, Colorado	Mar., 1921
M. Burke, Ariz.	Mar., 1922	C. Alexander, N. Y.	Mar., 1921
J. W. Hodge, N. Y.	Mar., 1922	J. Fencil, Wisc.	Mar., 1921
J. W. Haar, La.	Mar., 1922	H. Cornils, Oregon	Mar., 1921
D. W. Smith, Rhode Island	Mar., 1922	C. Schmid, Nebr.	Mar., 1921
E. A. Dillon, Nev.	Mar., 1922	J. Schwarzmann, D. C.	Mar., 1921
D. F. Kuster, Washington	Mar., 1922	M. Stettner, Minn.	Mar., 1921
C. A. Whitacre, Ohio	Mar., 1922	F. Barrick, Ohio	Feb., 1921
J. Poettgen & Co., Missouri	Mar., 1922	Elmer Wetzel, N. J.	Feb., 1921
W. T. Long, Colo.	Feb., 1922	J. Potthoff, Nebr.	Feb., 1921
C. Robertson, S. Africa	Feb., 1922	N. E. Hart, Okla.	Feb., 1921
J. Zavadink, Kans.	Feb., 1922	C. Knudson, Iowa	Feb., 1921
P. C. Oldroyd, Utah	Feb., 1922	C. Button, Kans.	Feb., 1921
V. Vanouret, Wisc.	Feb., 1922	N. F. Hartsoe, Mo.	Feb., 1921
W. Parker, Mich.	Feb., 1922	I. Qoeple, N. C.	Feb., 1921
J. DeGlopper, Mich.	Feb., 1922	E. Pratt, Ill.	Jan., 1921
Nordstrom Bros., Kans.	Feb., 1922		



The Army Horseshoer.

NORMAL SHOEING

BY normal shoeing is meant the shoeing of a sound foot of a horse with proper gaits.

Raising the Foot

38. In preparing to raise a horse's foot, never approach the animal suddenly, for he will not only be startled, but a sudden pull at his foot will probably disturb his balance, and the lifting will be more difficult for both man and horse.

To raise the forefoot, the shoer stands with his back to the horse's head and places his inside hand on the horse's shoulder. Then, bending over, he runs his hand gently down the back of the leg until the fingers, with the thumb on the outside, are just above the fetlock. The shoer's shoulder is pressed against the shoulder of the horse, forcing the weight upon the other forefoot. (Pl. V, fig. 1.) A slight grasp of the hand on the tendons is usually sufficient to induce the horse to raise the foot.

The shoer next straddles the horse's leg and holds the foot upon his knees, standing so that his body is about opposite the horse's shoulder, and in close to him, so that the horse's leg is not pulled outward in a strained position. The shoer's toes should be turned in to give strength to the position. (Pl. V, fig. 2.)

39. Raising the hind foot is performed in two different ways. In the first method the shoer, standing at the horse's flank and with his back to the animal's head, bends until his shoulder presses the horse's thigh, runs his hand gradually down the tendons and grasps them as in raising the forefoot. In the second method, the one generally employed, the shoer stands as in the first method, but with his outside foot advanced (Pl. VI, fig. 1); the hand nearest the horse is placed upon the animal's hip, gently pushing him

over and forcing the weight upon the opposite hind foot; meanwhile the other hand is run slowly down the back tendons from below the hock. The leg is grasped under the fetlock and is slightly raised forward. The shoer now swings his inside leg under the horse's leg (Pl. VI, fig. 2), presses it with his knee and extends it to the rear to the position shown in Plate VI, fig. 3. Care must be exercised that the foot is not held too high nor carried too far to the rear or outward, for the discomforts of these strained posi-

1. Of the action of the feet when the horse is in motion.

2. Of the shape and position of the feet at rest.

3. Of the evidence of wear on the old shoe.

For the first examination, the horse having free use of his head, should be led at a walk and at a slow trot upon level ground. Uneven ground will produce modifications of the natural gait, and a tight rein or a short hold on the halter shank will also alter the free, natural motion.

The shoer assumes a squatting position and observes the feet as the horse is led past him, away from him, and toward him. The manner in which a foot leaves the ground, its path in the air, and the manner in which it is planted should be closely watched in order to detect any of the defects of gait which can be remedied by intelligent shoeing. (See Chapter VI.)

41. For the second examination, the horse should stand at ease on the floor, the shape of each foot and leg should be observed from the front, from each side, and from the rear, care being exercised that the leg, at the time, is bearing its proper share of the animal's weight.

The shoer first studies the natural pastern conformation. Is the pastern slanting inward (toe in), is it vertical (straight), or is it sloping outward (toe out)? (Pl. VII, figs. 1, 2, and 3.)

Having decided this point, he then studies the position of the "pastern axis" and the "foot axis."

As seen from the front we may consider that the "pastern axis" is the imaginary line exactly splitting the long pastern in two, and that the "foot axis" is the line exactly splitting the foot in two; that is, the line from the center of the toe to the center of the coronet. (The foot axis

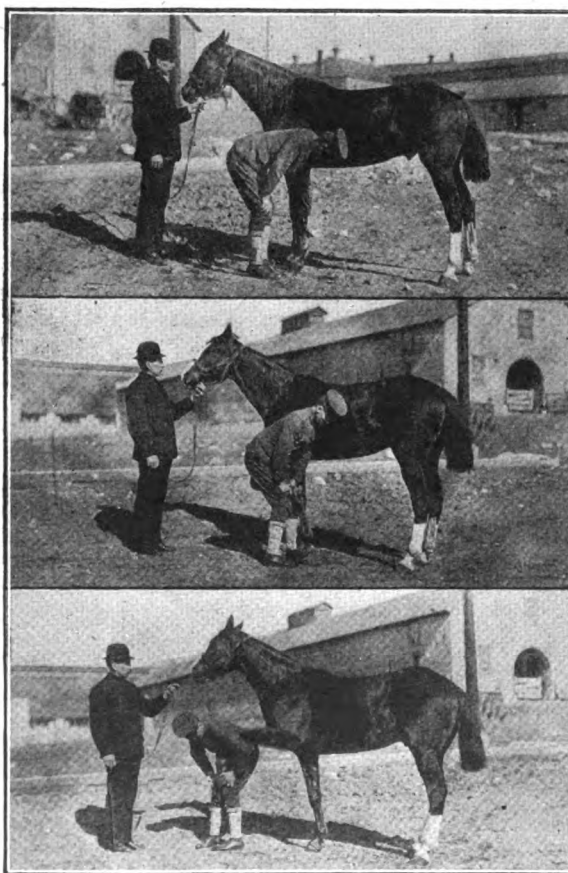


PLATE V—RAISING THE FOOT

tions will induce the horse to pull his leg away.

Preliminary Examinations

40. Three careful examinations should be made before old shoes are removed from the horse:



may be drawn on the wall in chalk.)

These two axes should be in prolongation or appear to be one straight line *no matter what the natural pastern conformation* (figs. 1, 2, 3, and 5), and if the shoer finds this condition satisfactory he will simply need to prepare the foot evenly for shoeing, as explained later. But if the two axes do not appear as one straight line there will be a break at the coronet. This is a proof that the foot is not level and that the horse is not standing correctly. If the line is "broken out" (fig. 4) the prolongation of the pastern axis falls to the outside of the foot axis and the inner wall is too high, and the fault is remedied by nipping off more of the inside wall than of the outside. If the line is "broken in" (fig. 6) the prolongation of the pastern axis falls to the inside of the foot axis and the outside wall is too high and should be trimmed down more than the inside. The dotted lines in the figures show the amount to be trimmed off.

It will be noticed that the "broken out" foot *looks like* the "toe in" and the "broken in" foot *looks like* the "toe out," but in the natural conformations there is no break at the coronet.

42. Standing at the side, the shoer should notice the height of the foot, the length of the toe, and the slope of the line of the toe; that is, the front line of the hoof as seen from the side.

Here, again, we have three cases of natural pastern conformation: The "sloping," the "regular," and the "stumpy" (figs. 7, 8, and 9); but the line of the toe should, nevertheless, be parallel in each case to the pastern axis as seen from the side.

By careful sighting from the side, draw a chalk line between the second and third clinches, with exactly the same slope as the line of the toe. This mark will generally have the same direction as the horn fibers. Now stand back and determine if this mark and the "pastern axis" as seen from the side are one and the same line. If so, trim off the surplus growth evenly. If not, the line will be broken at the coronet. In "broken back" (fig. 10) the prolongation of the pastern axis falls to

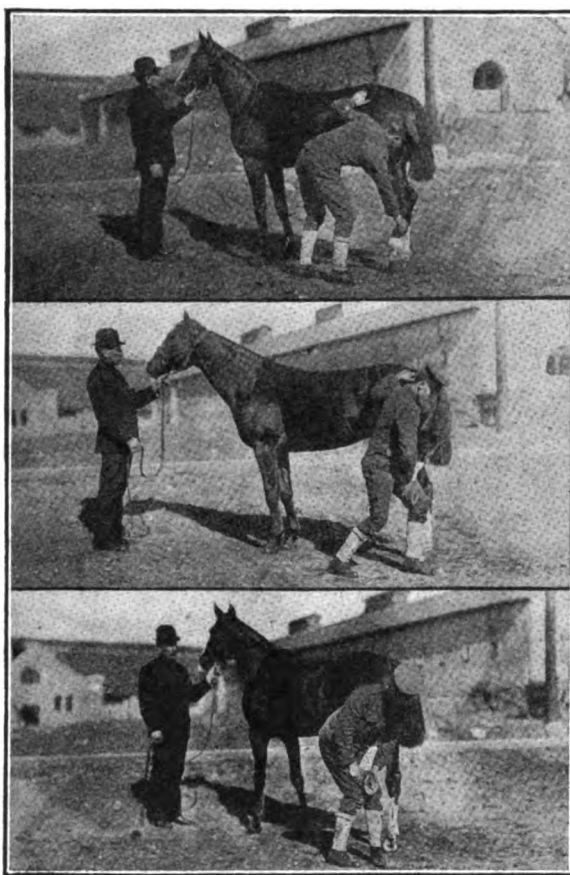


PLATE VI—RAISING THE FOOT

the rear of the foot axis and the toe is too high and should be trimmed more than the heel; in "broken forward" the prolongation of the pastern axis falls in front of the foot axis and the heels are too high and should be trimmed more than the toe.

The "broken back" *looks like* the sloping pastern and the "broken forward" *looks like* the stumpy pastern. The break at the coronet, however, is the sure guide.

For the third examination the foot must be raised.

43. The wear of the old shoe should be carefully noted as a check on the preceding two examinations. If the shoe has worn evenly, its position on the foot was undoubtedly correct. If one side of the shoe shows more wear, (a) that side may have been fitted too closely; (b) there may be some fault in gait which should have been noted in the first examination; (c) the foot may not have been properly leveled in the last shoeing; (d) the quarters, as frequently happens, may have grown unevenly since the last shoeing. Horses with long, sloping pasterns wear the shoe more at the heel, while those with short, upright pasterns wear the shoe more at the toe. There is a slight scuff at the moment of breaking over, which pro-

duces a normal wear at the toe, but overworked horses and those suffering from disease show more than this normal wear.

Removal of the Old Shoe

44. The clinches are cut off or straightened with the clinch cutter and hammer. The sharp edge of the clinch cutter is placed under the edge of the clinch and struck with the hammer until the clinch turns up flat against the wall or is broken off. If even one clinch is left holding it may break off the portion of the wall to which it is fastened.

Beginning at the heel, each side of the shoe is loosened with the pinchers and, gradually working toward the toe, is separated from the hoof until all the nails are free except those at the toe with the pinchers and is pulled toward the center of the foot. If pried over the toe toward the outside of the foot, part of the hoof may be broken off. Any stubs of nails remaining in the foot must be removed.

To Prepare the Foot

45. With the horse standing evenly on its feet examine the foot and pastern axes to determine the necessary changes, if any, to be made besides the removal of the surplus growth of horn. Then taking the knife in the right hand, back of the hand down, the blade coming out at the little finger, palm of the left hand supporting the wall of the hoof and the left thumb on the blade to assist in cutting and to prevent slipping, pare away the dead horn near the white line until live horn is reached, being careful *not to go farther back than the last nail hole*. This is done to ascertain the amount of horn that may be removed and to facilitate the use of the nippers. The knife must never be used on the bars or the frog. The bars strengthen the hoof and assist in its expansion. Cutting therefore weakens them and prevents them from performing their function. *Never use a knife on the hoof of a horse that has been running barefoot, nor on flat feet, either natural or diseased.*

Ragged parts of the frog may be cut away by careful use of the nippers.

In removing surplus growth of horn it is safer to lower the toe first, for, if the heels be lowered and, later, it is found that a correspond-



ing amount of horn can not be cut from the toe, it will be impossible to put the foot at the proper angle without the use of heel calks or a thickened web at the heels.

Taking the nippers in both hands so that the handles are perpendicular to the plane of the bearing surface, begin at the last nail hole and cut until the white line shows plainly and live horn has almost been reached; start with a thin cut or bite and gradually increase the depth of bite to the point of the toe; continue along the opposite wall to the last nail hole on that side, gradually diminishing the bite.

46. Heavy horses with wide feet and horses raised on soft, marshy pastures usually have flat feet. The natural flat foot, although particularly liable to bruises of the sole, must be classed as a sound foot and must be distinguished from one that is flat as a result of disease.

On account of its shape, the natural flat foot is sometimes called "flare foot." The wall in such a foot wears away (or is trimmed away) at a more oblique angle than in the ordinary upright foot, and it is therefore frequently necessary, in the preparation, to remove a part of the outer edge of the wall in order that the nails may be driven in the white line where they belong.

The preceding figures clearly explain this case, which must be remembered as the *only case* where it is permitted to rasp outside of the wall.

47. In general.—The foot should be prepared so that it will approximate as nearly as possible to a state of nature, and only such trimming is allowed as is absolutely necessary for the purpose of fitting and securing the shoe. (*To be Continued.*)

The Motor Car Paint Shop—V*

A Series of Helpful Articles on Painting and Re-painting the Automobile.

"Three-V" System for Medium-Quick Work

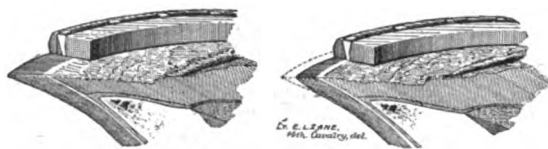
Wood and Metal

FIRST DAY, A. M.

IF METAL, scratch-brush and remove all rust and scale, and roughen the surface somewhat with emery-cloth or paper. If wood, work the surface down close and fine with No. 1 sandpaper. Dust off and apply a well-brushed-out coat of "V" Priming, a material that dries in forty-eight hours, requires no wiping.

*Courtesy Valentine & Company.

ing off, lays close and firm to the surface, is elastic enough to respond perfectly to every change in either metal or wood, offers an ideal support for all subsequent coats, and is subject to no change in its physical



THE ONLY CASE WHERE IT IS PERMISSIBLE TO RASP AWAY THE OUTSIDE OF WALL—SEE ACCOMPANYING TEXT

structure during the process of hardening; this latter being an invaluable point of merit.

Moreover, it possesses a chemical attraction for coats used directly over it, making it a primer of rare worth and usefulness.

Let dry forty-eight hours.

THIRD DAY, A. M.

Prepare "VV" Filler, which comes in the form of a heavy paste, by adding gradually, stirring vigorously meanwhile, a quantity of turpentine sufficient to reduce the mass to a consistency slightly heavier than ordinary paint. Apply with a soft, chisel-pointed, oval-bristle brush, laying on a full uniform coat.

This "VV" Filler is prepared specially to lay next above "V" Priming, and is of a nature like "VVV" Surfacers except that in point of elasticity it approximates more nearly, as it should, "V" Priming. This is to be preferred on all accounts to the shop-prepared material intended for the same purpose.

Let dry forty-eight hours (except to putty, as follows):

FOURTH DAY, A. M.

To three parts of dry white lead and one part of oil-ground white lead, add equal parts of Coach Japan and Rubbing Varnish until a putty of such consistency is obtained that after thorough kneading it can be freely handled without sticking to the hands. Then go over the surface and putty where necessary.

FIFTH DAY, A. M.

Take the desired quantity of "VVV" Surfacers and stir into it enough turpentine to reduce the heavy paste to a medium paint consistency, and with a brush precisely like that used for "VV" Filler, apply a nicely flattened outcoat of the surfacer, laying it off lengthwise with the panels.

Let dry twenty-four hours.

This is an excellent, soft, free-working material furnished in various shades to serve, if need be, both

as a surfacer and as a ground-work for the color coats.

Additionally important to the practical man is the fact that this surfacer when thoroughly dry is an easy, rapid-rubbing pigment, with a finish after rubbing to satisfy the most exacting.

"VV" Filler and "VVV" Surfacers possess filling and leveling properties to a marked degree. They are manufactured under exact formulas which insure absolute uniformity of composition, working qualities and surfacing capacity, being to this extent, at least, superior to the shop-compounded pigments.

SIXTH DAY, A. M.

Apply second coat "VVV" Surfacers, laying off at right angles with the first coat.

Let dry twenty-four hours.

SEVENTH DAY, A. M.

Mix yellow ochre to a rather stiff paste in Coach Japan, and thin down to a water-like consistency with turpentine. Apply for guide-coat. Or, if preferred, and following the practice observed in many first-class shops, omit the guide-coat altogether.

SEVENTH DAY, P. M.

Rub the surface with artificial pumice-stone or brick, avoiding surface disfigurements and washing thoroughly after rubbing.

EIGHTH DAY, A. M.

Lightly pass over the surface with No. 00 sandpaper. Dust off and apply a light, even coat of Celox Sealer, well brushed out, using the material just as it comes from the can. Let dry twenty-four hours.

NINTH DAY, A. M.

Apply one coat of color ground-work or black.

NINTH DAY, P. M.

Gently, with curled hair, dust off and lay on second coat of flat color or black.

TENTH DAY, A. M.

Apply first coat of Color Varnish. Let dry twenty-four to thirty-six hours.

TWELFTH DAY, A. M.

With a piece of thin rubbing-pad moistened, and dipping in pumice-stone flour, work over the surface sufficiently to knock down any dirt "slugs" and dull the luster of the varnish. Wash up carefully, dust off and flow on second coat of Color Varnish, or flow on a coat of a Medium Rubbing-varnish.

Allow the color varnish or the medium rubbing thirty-six hours to dry. At the end of this period, rub down firmly and uniformly with



pumice-stone flour and water, wash perfectly clean, dust off and apply a coat of Body-varnish.

"VVV" Surfacer Special

In case it is preferred, for reasons of economy or otherwise, to sandpaper the surface instead of rubbing it with rubbing-stone or brick and water, "VVV" Surfacer Special used directly over "VV" Filler is specially adapted. It is furnished in the form of a heavy paste and may be thinned with turpentine sufficiently to be applied to the surface with a double-thick, flat, camel's-hair brush, under which, to furnish the best surfacing results, it should flat-out to a smooth, velvety finish. Allow thirty-six to forty-eight hours to dry, when it will sandpaper freely and to a compact, dense surface. In other words, Valentine's "VVV" Surfacer Special is an ideal sandpapering material. *(To be Continued.)*

The Oxy-Acetylene Plant—11

Its Installation, Operation and Torch Manipulation

DAVID BAXTER

THE METAL we are called upon to weld most frequently is cast-iron. If proper precautions are taken, it is by no means a difficult metal to weld. However, it is not easy to give fixed rules for welding this metal, because there are several grades or kinds of cast-iron; hence, a procedure for one would not always apply to others. The metallurgist follows his own rules and formulae for the various amounts of the substances or elements which make up the iron; but to the torch-operator, they appear as a mere jumble of words and figures. So we must find some other means of instructing him in ways of knowing the grades of cast-iron. The most simple way seems to lie in the structure of the metal, in so far as it is visible to the naked eye.

The cast-iron referred to in the following discussion is also known as gray iron. There is a cast-iron called white-iron, which is a form of gray-iron; but whether a pure gray-iron or a white-iron or any of the grades between, all have the same characteristic — expansion followed by contraction. This characteristic varies with the different grades and structures, but only in extreme cases is it serious enough to bother the welder. By extreme cases is meant soft gray-iron, being one extreme, and hard white-iron the other.

The soft gray-iron is harder to

break, but easy to dent with a hammer. Its structure is coarse with shiny grains that sparkle in the light. These grains are somewhat smaller around the edges of the break and grow larger toward the center. The break is coarse and rough, sometimes breaking off in flakes from one side or the other of the fracture. It is very easily filed, drilled or cut.

As we approach the harder grades of cast-iron, it is not easy to estimate the degree of hardness by the above tests. The harder grades show smaller grains by comparison throughout the entire break; they are less shiny and sparkling and the break is nearly always squarer. It is also not as rough as cast iron. By these harder grades is meant, say, from about midway between very soft and very hard to the hardest iron.

The white iron, or chilled iron, is very hard, due either to the mixture used in making or to frequent remelting. The fracture is usually smooth and has a shiny crystalline surface, but no visible grains. The appearance is somewhat glassy and whitish. It is almost impossible to grind, file or cut. It is very brittle, and is too easily broken to be of much value commercially.

Soft gray iron will harden and whiten a few degrees with each successive remelting. This is especially true if it has been cast into thin sections, such as used in stoves. Therefore, a soft iron filler will be somewhat harder after it has been melted by the torch. Soft gray iron may be cast into large thicknesses with little danger of cracks or distortion. But hard iron is exceedingly difficult to cast, except where the casting is of uniform shape and thickness. The expansion and contraction is so abrupt and extensive that it is hard to regulate or to control it. The expansion reaches the maximum and returns to the minimum so quickly there is little time for artificial cooling, reheating or other artifices used to regulate expansion and contraction. However, we are seldom called upon to weld the very hard grade of cast iron, it being little used on machinery that is liable to break.

When cast-iron is melted, it reaches its limit of expansion; when cold, it reaches its limit of contraction. Foundrymen figure one-eighth of an inch per foot for the limit of expansion to the limit of contraction. While this varies a little in the different textures, it is near enough for our purpose. The metal expands in all directions and all parts. The

slower it heats the slower is the expansion; and the slower the cooling, the slower the contraction. From this we gather that the heavier parts expand and contract slower than the lighter ones, if the heat applied is the same. Therefore, we must aid the heavier sections to heat or cool, to keep the expansion and contraction even with that of the lighter sections.

Soft cast-iron is more fluid and does not "set" as rapidly as hard iron, so we take this into consideration when welding. Soft and hard iron, both are apt to be influenced by the same conditions and elements. They will take up or absorb certain gases and substances that work good or ill effects upon their structure. They will take up oxygen from the air or from the torch if it is not regulated properly—that is, if it carries an excess of oxygen gas.

The proper fluxes or welding powders will partly, at least, neutralize the oxygen in the air and that in the torch. By regulating the flame accurately we minimize the danger of absorbing its oxygen. By manipulating the torch we can make use of the outer flame to prevent the oxygen of the air from reaching the melted weld. A proper selection of flux will do much to offset the effects of too much oxygen. The effects are termed oxidizing and the counter-action is termed de-oxidizing. Oxidizing in cast iron is so slight that we might say the term applies only to steels and wrought iron, also aluminum and copper alloys. Oxidation is in reality the burning up of the metallic part of the composition. A description of the symptoms by which we can tell when the metal is oxidizing has been given in other installments.

Another peculiarity of both soft and hard iron is carbonizing. Carbonized iron is worthless, as there is no known method of restoring it to its original state. The best we can do is to prevent it as much as possible. Of course a great many jobs come to us already carbonized, but this is no fault of ours nor can we prevent it.

Badly carbonized metal is well illustrated in a section of stove grate, which appears clean and solid but will break and shatter to pieces very easily when tapped with a hammer.

To prevent carbonizing when welding cast-iron, have the flame exactly neutral. Do not have either of the gases exceeding the other, especially the acetylene gas. Acetylene gas causes part of the carbonizing and the danger is greater if



the acetylene is not clean and pure.

There are several decarbonizing fluxes on the market which are also partial preventatives of carbonizing.

Besides an excess of acetylene and besides the impurities in it, we have yet another cause of carbonizing. This is successive overheatings. Again, this nearly always happens before the job reaches the welder. The operator will run across it in auto engine cylinders. It is caused by the engine being allowed to run hot, time after time. This phenomenon not only occurs in the bore of the cylinder, but seems to soak, so to speak, clear through the water jacket. A cylinder which is badly carbonized in this manner is very difficult to weld. An operator who is not aware of it will be puzzled because the weld will not respond as it should.

In extreme cases it is almost useless to waste time trying to weld badly carbonized cylinders or other castings, but, if the operator will use patience and thoroughly mix in the new metal, removing all slag and scale as it comes to the surface, he will often be rewarded by a fairly good weld. He can also help some by re-inforcing the weld, that is, by piling up surplus metal on both sides of the joint of the weld.

It is customary to use soft iron filler rods, for both soft and hard cast-iron. A hard iron filler can be used if necessary on hard iron. Norway iron, copper or other fillers can be used for welding either kinds of gray-iron, but do not give as satisfactory results as plain soft gray iron fillers. Soft cast-iron fillers should be used for cast-iron jobs be they large or small.

Hard iron requires more heat for welding and more for pre-heating. It requires an even heat, and greater care, because it cracks easily. It is apt to be slaggy and full of pin-holes because it is poor material in the first place.

Before going further let us revert to carbonizing. The operator can tell if the metal is carbonized after he starts to melt it. The metal is filled with flowing white spots that move around and toward the edges of the weld. They vary in size from the point of a pin to as big as the large end of a pencil. Most of them appear for a short time, then consume themselves or fly away in form of a spark. If there is yet good metal in the job it will flow toward the sides of the weld, in waves having a clear, milky look. If the metal is badly carbonized the white spots will be more thickly scattered over the mol-

ten weld. In this the weld will wash out in deep holes. When we attempt to add new metal, we find it will not unite with the weld, but as has been said before: do not give up too easily. Use patience and give it a fair trial. Just when you think it is useless the metal may stick and mix.

Some operators claim the ability to soften gray iron. It is done by heating the iron red-hot, covering it with brimstone, and allowing it to cool as it will.

When it is necessary, we can cool heavy parts of very hard iron artificially if we are careful to proceed slowly.

We cannot hammer the weld of cast-iron as we do of steel, it disintegrates if hammered when hot. Although it might help to settle the metal in the weld if we jarred the castings by tapping with a hammer while the metal was yet fluid.

Manufacturers furnish tables for regulating pressure of gases for welding gray-iron. This pressure depends on the size of tip used, which in turn depends upon the weight and thickness of the casting. The pressure at the tip increases as the weight and thickness of the job to be welded increases. The pressure at the regulators varies in the different makes of torches, due to a different arrangement in the mixing chamber. Some torches use equal pressure of both gases. Some use twice the pressure of one or the other.

The mixing-chamber is the place where the two gases unite before issuing at the mouth of the torch. Some mixing chambers are located in the head and some in the handle of the torch. Another kind is made in the tip; with this kind we have a special mixture for each size of tip, although one is as effectual as the other.

The point of the neutral flame is nearly always kept clear of the melted weld. That is: the tip of the white flame is not allowed to touch the weld, only in special cases, where it is used to break the scale and stir up the slag. Then it should be done carefully with short, quick jabs or dips.

When we weld gray-iron to some other metal we choose a filler of the metal easiest to melt. It is of very little benefit to twist two different kinds of filler together for use upon cast gray-iron. It is better to keep the end of the filler in the molten part of the weld; all the heat then passes to the weld. There is less danger of burning either metals,

and we can stir the metals together without danger of chilling the weld by removing and replacing it at a lower temperature.

When allowing cast-iron to cool, remember it should be given more time than other metals because it is easier and more liable to break.

We have yet another form of cast-iron. This is called malleable cast. It is used on machinery such as farm implements, that require lightness combined with strength. When malleable is remelted alone in the cupola furnace, it turns into a worthless metal so far as strength is concerned. It has the same general structure as white or chilled gray-iron; in fact, it is a form of white iron, and may be used where some white iron is used. When we break a malleable casting we find the break is fine-grained throughout. Sometimes it has a black spot in the centre of the broken section surrounded by light colored metal. Sometimes it is all black and sometimes it is all light colored and very grainy. This difference in appearance is caused by a difference in the treatment it has undergone. Some of it is not as good as others. The malleable having the black spots called the blackheart is perhaps the best.

In welding malleable we must be extra cautious. It has a tendency to burn and fly away before the flame the same as steel. Use a Norway iron filler, wrapped with a copper wire, then use a good flux and you can usually produce a satisfactory weld. But the work must be done rapidly and deftly. Keep the line of weld as narrow as possible and still thoroughly mix or flow the two sections together. Be careful not to hold the flame too close to the melted weld as it is easily burned and blown away. Keep the torch continually in motion; move it around in tiny circles in either direction to help prevent burning.

When malleable-cast is melted the molten mass glows under the flame with a peculiar iridescent light that reminds one of the Colorado gold stone.

Malleable should receive much the same treatment when welding, as steel. It is liable to oxidize and expands and contracts the same as steel. Malleable is perhaps the most difficult metal to weld. It changes to a form of cast or white iron so easily that many operators give it up in disgust. But be a little more careful with the preheating and preparation; be a little more careful to keep the flame regulated and to handle it properly. Do not melt too



far back from the edge of the weld; that is, do not make a wider strip of melted metal than is necessary, as it gives a better chance for the weld to break on account of the tendency to turn to the useless white metal. It is a good idea to reinforce malleable welds by piling up the metal along the weld.

A few more words of explanation on the subject of distortion, and we will take up some examples of cast-iron welds. Suppose we were welding a round iron of say, two inches diameter, and we had grooved it on both sides, causing the broken ends to meet like two wedges with the sharp edges together. Now we welded the one side full. The expansion of this mass of metal causes the two ends of the round iron to be pushed around out of line. Of course the resulting contraction tends to pull it back again but usually not so much. Now we weld the other V. This will pass through the same action; the expansion will endeavor to push the ends around and, finding resistance, may warp the iron to one side. This distortion may be overcome to a degree by clamping the ends solid, but it is much better to either turn the job over several times while welding, or to grind or sharpen the ends of the break to resemble a dull pencil instead of wedge-shaped; then roll it as the weld is made. Stick it together solidly and in perfect line before the rolling is attempted. Roll it on an iron leveling plate.



Benton's Recipe Book

Various Methods for Treating Brass are frequently needed and the following should prove useful:

Brass castings that have become dirty or corroded in service may be cleaned in the following wash: 1-3 part nitric acid, 2-3 part sulphuric acid, and ½ pound common salt to each 10 gallons of solution. Dip the castings in the solution for half a minute and then rinse in boiling water and dry in pine sawdust.

Bronze may be renovated and re-colored by mixing one part muriatic acid and two parts water, and applying the diluted acid to the bronze articles with a cloth. Before applying the acid the articles should be cleaned thoroughly from all grease. After having applied the

acid let the article dry, and then polish with sweet oil.

A solution for bluing brass may be prepared by dissolving 1 ounce of antimony chloride in 20 ounces of water and adding 3 ounces of pure hydrochloric acid. Any amount of solution may be made up, provided the different ingredients are in the above proportion. To apply, place the warmed brass article into the solution until it has turned blue. Then remove it and wash with clean water, after which dry in sawdust.



Queries— Answers— Notes

Another Smith After the Hohenzollern Goat—I've joined the army. I am in the Light Railway Regiment. Just couldn't stay out of it. I like the life first rate so far as I've gone. Am taking lots of drill and other exercises such as I never would have taken in the shop.

They have some shop here—48 fires in it and they need them all.

GEO. BELL, Co. A, 21st Engineers, Ill.

Forty-five Years at the Forge and Still Learning—I want to thank you kindly for the benefit the American Blacksmith has been to me. I have been at blacksmithing forty-five years the 20th of December last, but still it has always been a help to me and I am almost 60 years of age.

I drove and clinched 66 shoes last Wednesday from 10 a. m. until 4:45 in the afternoon. Most of these horses weighed from 1,400 to 1,800 and some of them were colts at that.

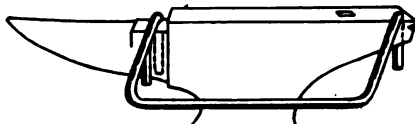
JOHN A. ZIEGLER, SR., Iowa.

Fine Finishing Tools—I am interested in finishing tools and would like to know how the finish is obtained that appears on new saws, draw shaves, etc.

MICHAEL BYRNES, New York.

In Reply—The finish that generally appears on nice tools is nearly always a perfect polish, the final polishing being done with a cloth buffing wheel turning very rapidly and using a small amount of crocus polishing brick on the edge.

There is another finish that sometimes



MR. NICHOLS' "HANDY HELPER"
DESCRIBED IN THE ACCOMPANY-
ING LETTER

appears on polished parts of machine tools to make them look nice. The surface is nicely polished all in one direction and then "dabbled" over with a very sharp

scraper or with a piece of wood with crocus cloth over the end. It can be spotted over evenly so that the result is very pleasing.

S. S., New York.

Invents and Patents Garden Cultivator—The object of my invention is to make three different plows where but one grew before and without turning a nut: with the side shovels turned up along the frame a single shovel remains for laying off the rows; the center shovel turned back and the side shovels down we have a cultivator.

This is the best rice section of the South and, as rice culture calls for a great many tools and machinery of all kinds it makes blacksmithing good the year round. We are called on to make everything from sack needles to a threshing machine. Prices are good here as they have never been cut as in some communities, which is bad for any business.

I have a little helper that may be new to some while others may be using it but I find it a great help in welding along. The accompanying drawing will explain its construction and use. It is made of 7/16 or 1/2 round stock. One end is bent to go into the round hole in the anvil and at the other end is a square fork to fit over the offset on the anvil. This supports the one piece of stock to be welded while the weld is being made, taking the weight off the weld. I weld buggy stubs alone and find this a great help. This may be old to some but new to others but I am passing it along for what it is worth in the hope that it will help some other smith.

N. E. NICHOLLS, Arkansas.

JOHN J. DEVINE GENERAL BLACKSMITH

Horse Shoeing a Specialty. Tools and Ironwork of Every Description. All Kinds of Boat Work

Eighth St. and West Ave., Ocean City, N. J.

TERMS CASH

MR. DEVINE OF NEW JERSEY, KEEPS
BUSINESS COMING HIS WAY
WITH THIS AD.

A Suggestion to remedy Price Cutting and an Illinois Price List—I never see anything from this part of Illinois, so I thought I would write you a few lines and give you our prices. I am a young smith in comparison to some of the writers but I have had quite a little experience as I work at all branches of the business from the anvil to woodwork. I see a piece from E. E. Mercer, of Kansas, about auto-spring welding and from what experience I have had with them he is right and gives some good advice. Our worst trouble here is that we have too many price-cutters. I think any smith that cuts prices ought to be put out of business somehow. We have to pay a license in Illinois to shoe horses but that does not seem to help the price any. If our legislators would fix a price as well as a license and revoke any smith's license that cut the price it might help us to establish a better price. I will give you a few of my prices:

4 new plain shoes	.....\$ 2.00
4 old shoes, plain	..... 1.40
4 new neverslips up to 5	..... 3.20
4 new neverslips, 5 and 6	..... 3.50
4 old neverslips recaked	..... 2.20
Plow sharpening	..... 30c, 35c and 40c



Plow points, any size	1.00
Six cultivator shovels sharpened...	.80
Tire setting buggy and wagon, each	.75
New wagon tongue, complete	5.00
New wagon tongue, center	3.00
Tongue Hounds, each	1.00
New wagon axle	3.50
Bolsters, complete old irons	2.25
Spokes and felloes, all kinds, each..	.23
Cutting wagon down	12.00
Cutting buggy down	11.00
New buggy shafts put in, each	2.00
Buggy Reaches, each	\$1.00 to \$1.25
New wagon coupling pole	1.00

C. CONRAD, Illinois.

Gives Some Good Advice to the Craft—The December issue of The American Blacksmith is at hand and I feel like expressing myself as did Mrs. Earl M. Shorter, of Missouri, that it came as a Christmas present.

I wish that thousands of our blacksmiths' wives would catch her spirit of encouragement and give other brethren of the craft just such a helping hand.

I often read over Longfellow's beautiful poem, "The Village Blacksmith" and say to myself, "Do I measure up to that standard or have I even set a higher ideal to correspond to these modern times?" I want to say right here that I certainly try and, like our fellow craftsman, Shorter, I find great encouragement expressed by the

good wife. Before I close I want to say just a word to the craft—Cut out booze, cut out price cutting, cut out the grouch. Put on a smile for everybody, especially the wife and kiddies and you will find 1918 one of the best ever.

GEORGE ABBEY, Arkansas.

Mr. Steinke Describes His Efficient Business System—The accompanying photograph shows an exterior view of a shop that we bought last March. We made a good purchase when we bought the place. It is located right in the center of the town and was formerly owned by a man raised up with this shop but there were three shops in town and none were making more than a bare living. Now, in ten months I have paid up half of the purchase price and provided the necessities for fourteen which means something in these days of high prices. I don't spend half of what I earn for whiskey like so many of the craft. That was the trouble with the man I bought this place of. I positively will not leave the shop during working hours to get a drink nor is there any "can rushing" allowed as whiskey and business mix no better than whiskey and gasoline. I honestly believe if a man takes care of business, business will take care of him. I have always had the name hereabouts of being a high-priced man and I always did receive as much and more for my work than any around here; also, I have the name of being a good mechanic and workman which sounds better to me than being a cheap skate and poor workman. Our prices are fairly good here, as we get \$2.00 and \$2.50 for 4 new shoes, \$1.40 and \$1.60 for old shoes and \$3.00 and \$3.50 for Neverslip shoes, setting same as old and 10c pair calk extra; plow work, 25c to 40c, sharpening, 10c, cutter plow point, \$1.00 to \$1.50 heel, 50c and all other work in accordance. Here is a pointer I can give to other men where collections are not what they should be. About six years ago I adopted this plan and it works like a charm. Of course 30 days is considered cash and gives an honest man a chance too but after 30 days I make an extra charge of 5c on each charge account or 10c on the dollar and now I receive from \$10.00 to \$90.00 out of \$100.00 cash as soon as the work is taken out of the shop and I also pay cash for everything I buy and discount my bills which amounts to quite a sum during the year and makes a man's credit so much better. We have a system of our own in keeping a memorandum of everything we do, both cash and credit, the number of shoes put on and the customer's name. We have a tablet and cash board and drawer on the flue of the forge and the cash drawer under the electric blower where everything is convenient and handy.

each day and also expenses so that with very little trouble we can at any time see what's doing.

B. A. STEINKE, Ohio.

Making a Pre-heating Outfit—As I have an oxy-acetylene welding outfit I would like to have you tell me the best way to make a pre-heating outfit.

I will describe the way I have one planned and would like your opinion on it. First; I will make an air-tight box about three feet square, the top of sheet iron and covered with fireclay and a lot of holes drilled through the top and run a pipe from the blower into the bottom of the box and size I want and block the remainder of the holes in case I want a small fire. If it should be necessary to pre-heat a large piece I could leave all the holes open. I intend covering the air box with firebrick. I want to burn either coal, coke or charcoal in the fire.

WILLIAM ROBARGE, Michigan.

In Reply—One of the best methods I know of for making a pre-heating furnace is as follows. Take a piece of boiler iron, about 30-in. x 36-in., and place two wheels under one end and a very large caster or wheel that will swivel around under the other. These should be so mounted that the plate of iron is about 18 or 24 inches from the floor. A handle should be bolted on the under side of plate over the single wheel so one can easily take hold with one hand and move the pre-heater from one place to another. If a cylinder is to be preheated, proceed as follows: Have cylinder properly chiseled out and place it on two fire bricks (any red brick will do) laid flat-wise so the cylinder will only be raised about two inches; set bricks up on edge around the cylinder and about four inches away all around the cylinder. Fill in around cylinder with charcoal and wet slightly with kerosene oil and ignite. This will gradually become a good fire and by adding charcoal occasionally the cylinder will soon get quite hot. If a piece of asbestos paper is placed over the top after the fire is going good it will help hold in the heat. A common cylinder will preheat in one to one-and-one-half hours so it will be ready to weld. Remove the paper that covers the crack and keep cylinder in fire and covered as much as possible with the paper and proceed to weld. By using several thicknesses of paper over the fire one will be protected from the heat of the fire. After the weld is completed cover with paper and hold the edges down with bricks and allow it to cool in the fire—not removing the casting until cold. This method never warps a cylinder. If necessary to remove casting from fire after welding, always cover with several thicknesses of asbestos paper with a bed of same under it. Very large castings should be buried with charcoal and allowed at least two hours to heat. This is the most satisfactory method of pre-heating that I have found in five years of welding.

E. W., New York.

As They Weld Axles in Australia—Went through some back numbers of "Our Journal" the other night to dig up an item I wanted and in the September issue (1914) I reread Wm. W. Watt's (of South Africa) reply about welding 1,000 Mile Axles. I agree with him in his remarks about C. W. Bell (March issue) and his way of welding those and similar breeds of steel.

One of our ways here of welding axles, is as safe and quick a way of doing the job as there is. The cows won't break provided one has a tire upsetter to shove them together, using a type similar to the Buffalo Forge No. 4 or the Star No. 2,



MANY INTERESTING AND PROFITABLE INVENTIONS ARE CREDITED TO TOILING MEMBERS OF THE TRIBE OF VULCAN AND HERE WE SEE THE LATEST CONTRIBUTION IN THIS DIRECTION

Mr. Noah Nicholls of Arkansas has worked out the efficient garden cultivator here shown. It is his "bit" towards helping Uncle Sam lick the Kaiser by giving us bumper crops for 1918!

We also keep a record of the amount of work done



made by the Champion Blower & Forge Co.

A "V." weld and the scarfs are chopped out with the hot chisel and if necessary, thin the scarfs down with a fuller.

Put axles in fire and heat until about to crumble, then put them into the upsetter and squeeze together and hammer lightly with the sledge as they are squeezing up. Take out of machine, put on anvil and pein the scarfs down; then put on borax and let soak in. Glass borax is quicker. Then take a second heat and treat like the ordinary way of welding when using borax, hitting light and quick and drawing the scarfs together until solid and then you can hammer it as though it had no friends. In this way you can do the job in two heats or at the most three heats and the third heat, if necessary, doesn't take much time to get up as you soon find out in the second heat whether it's a go or not.

One of the many advantages in welding either axles or tires in the upsetter is that you can leave your stuff on the long side, squeeze up and cut the surplus off. It also saves a deal of hard work and leaves the weld the strongest part of either axle or tire instead of the weakest as in the old way of doing these jobs, and, this applies to a lot of jobs which one can do when he has a tire and axle upsetter in the shop and a time-saver in that one has no jumping-up to do before welding, whether you are welding up axles or tires, 1-inch round or 2 x 3/8-inch., and also when welding iron and some of the mild steels you just heat up and make a butt-weld.

Another way they have here when welding axles is to simply chop off on a level with the hot chisel, allowing plenty of stuff for welding (no jumping-up of ends beforehand). Weld on the anvil, heat again and put in upsetter or shrinker or squeeze up to desired length and dress-up with swage or flatter if it's a square-bed axle. If the iron pounder has a power hammer, as illustrated in the article written by Will Bishop and published in the June and July issues of "Our Journal," he can smile and just turn the axle round or over and watch old man power hammer knock things into shape for him.

H. F. THOMPSON, Western Australia.

Contracted Hoof vs. "Contracted Head"
—Just a word in regard to Mr. Ott's, of California, item in the December number of "Our Journal" in regard to contracted feet and the proper shoeing. I like his idea fine and often practice it, but the worst trouble I find is with the horse owner. Sometimes you will find a man



"AND CHILDREN COMING HOME FROM SCHOOL LOOK IN AT THE OPEN DOOR."—Brother B. A. Steinke's Ohio shop is after the manner born to the Poet's ideal. It is situated in the shadow of the village academy where the merry ring of his anvil keeps tune to that of the school bell. If you were ever a REAL boy, which call would you answer?

that has a "contracted head" and you cannot make him understand this shoe. He always thinks that if you don't leave the shoe sticking out about one-half inch on each side of the hoof at the heel, that you are drawing the foot too much. I have put this same kind of a shoe on a horse and when the owner came in and looked at it he would make me take a pair of pincers and spread the shoe on the foot. Well, that is a pretty good idea, you can spread the foot a little in that way but you get the shoe outside the wall of the foot and it can't spread any more until you re-shoe the horse.

Mr. Ott must have better control of his trade than we have. We have a town of 600, and have general shops, so you see competition is O. K., but I like competition.

J. WILLIAMS, Missouri.

An Interesting Shoeing Case — I have read several interesting pieces in your journal and thought I would write a little piece for you to publish. I have been a reader of "Our Journal" for the last fourteen years. My father had been in business since 1879 up to Jan. 29, 1917, when he died and I think he was a reader of your journal most all the time. Since his death my brother and I have been running the place and it is now known by the

name of Hughes Bros. I have read several letters written by brother smiths over the country and no doubt this part of my letter will sound big but, nevertheless, it is true. We have a horse here which I have shod for the last six or seven years which is broken down in the soles of his feet and was that way the first time I ever shod him. He is a horse weighing about 1,850 lbs. I had always shod him with a No. 7 shoe with a bar to build the wall of his feet up with leather. I shod him this way up to about a year ago when they turned him out on pasture and just the other day they brought him in to have him shod again and such feet I never saw before! I did not have shoes big enough so I made them out of wagon tire, 1 1/2-in. wide by 1/2-in. thick and about 30 in. long. When they were done they were 9 inches wide and weighed 6 pounds apiece. I have shod horses of all classes from race horses up to draft stallions and have made shoes as light as 2 1/2 ounces, but never have I had to make such shoes before as these were. I think "Our Journal" is a big help to a smith if he will read it. Hoping you and all the brother smiths a prosperous year of 1918.

HUGHES BROS., Iowa.

Reboring Old Ford Motors—I would like to ask your advice in regard to reboring old Ford motors and putting in oversized pistons. Will it improve the service of the old motors so as to make it a profitable venture?

I have read "Our Journal" for two years and received much benefit from it; hence, I am sending in my renewal for three years more in advance.

EARL C. PRATT, Illinois.

In Reply—In answer to your inquiry as to whether it is a profitable thing to re-bore old Ford motors and put in oversized pistons: First, determine whether the car NEEDS new pistons. In order to find this out, have the valves "ground in," the ignition in good order, and the other parts of the car in their usual good working condition. If under these conditions you notice a loss in power when the car is pulling up a hill; or, if the spark plugs become badly carbonized or covered with oil; or, as often occurs, you are unable to advance the spark as far as was pos-

ZIMMERMAN'S

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Equipped for all kinds of machine work. Frozen or cracked cylinders welded by Oxygen-Acetylene process. Auto repairing a specialty. Batteries and auto accessories, oil and gasoline. Free air.

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Capable of taking care of all work, and all work done on the Square.

Standard Gas, Oils, Greases, Firestone Tires, Tubes and Automobile Supplies. Willard Storage Batteries.

The Slogan Adopted by Mr. Krause is One That Should Be Adopted By Other Smiths

sible when the car was new without causing a bad knock in the engine; and when you crank over the engine by hand you notice that one or two or maybe all of the cylinders appear to have less compression than is usual in Fords; if any or all of these symptoms are noticed, then it is reasonably certain that your Ford needs better fitting pistons and rings, or both. If, after careful inspection, you fail to find any scored places in the cylinder walls, (Of course a "scored cylinder" means that the cylinders MUST be re-bored), then the next thing to decide is whether to go to the expense of having the cylinders re-bored or simply have new oversize pistons and rings. In a number of cases the oil throwing and the compression and power loss have been remedied by putting a couple of these new patent piston rings ("Leak-Proof" for example) in the top grooves of each piston. This will not help the piston knock very much, however. In the case of an engine where it appears reasonably certain that the new rings alone will do the trick, the question of re-boring is a matter of investment and depends on how much you are willing to put into your car. Here is a rule that will help in deciding this question: If you feel that your car is worth (to you) the price of a complete overhaul,—such as having new bushings in the front axle spindles and steering gear, the transmission re-bushed, etc., where needed the rear axle thoroughly overhauled, in fact the entire car looked over—then, by all means, invest a little more money in the "bus" and have the cylinders re-bored and new pistons and rings fitted. The car will thus be given "a new lease of life." A suggestion regarding the selection of proper sized pistons may be helpful. If you know that the pistons are those that came with the car, then you are safe in purchasing the first oversize the Ford Co. provides which I believe is .0025" larger than the standard. In any other case it will be necessary to have the cylinders "miked up;" that is, carefully measured with an internal micrometer. This is the only sure way of KNOWING that you are getting just the right sized piston. In the case of pistons that fit too tightly, it is permissible to "lap them in" with fine grinding compound and oil. Great care should be exercised to make sure that all grinding compound is removed from the pistons, rings and cylinder walls. The writer considers this to be a last resort as a very little of the compound left embedded in a tool mark in the piston or cylinder wall can do a great deal of damage in a very short time.

C. L. WHITE, New York.

Is an Automobile Exempt for Debt?—I would like to have a question answered in the good, old magazine. When the exemption law was first put in force, there was no such thing as an automobile; hence, that is not enumerated in the law.

Is the automobile exempt for debt? Has the law ever been tested and is it the same in every state?

Last year, at the Topeka, Kansas, convention, I asked the following question: "How many present KNOW what they are earning as proprietors of shops? What were your earnings in 1916?—don't all speak at once! Mine were \$2.60 per day net; a one-man shop."

Goff, Kansas.

In Reply — In answering this inquiry the facts in the following case are very pertinent.

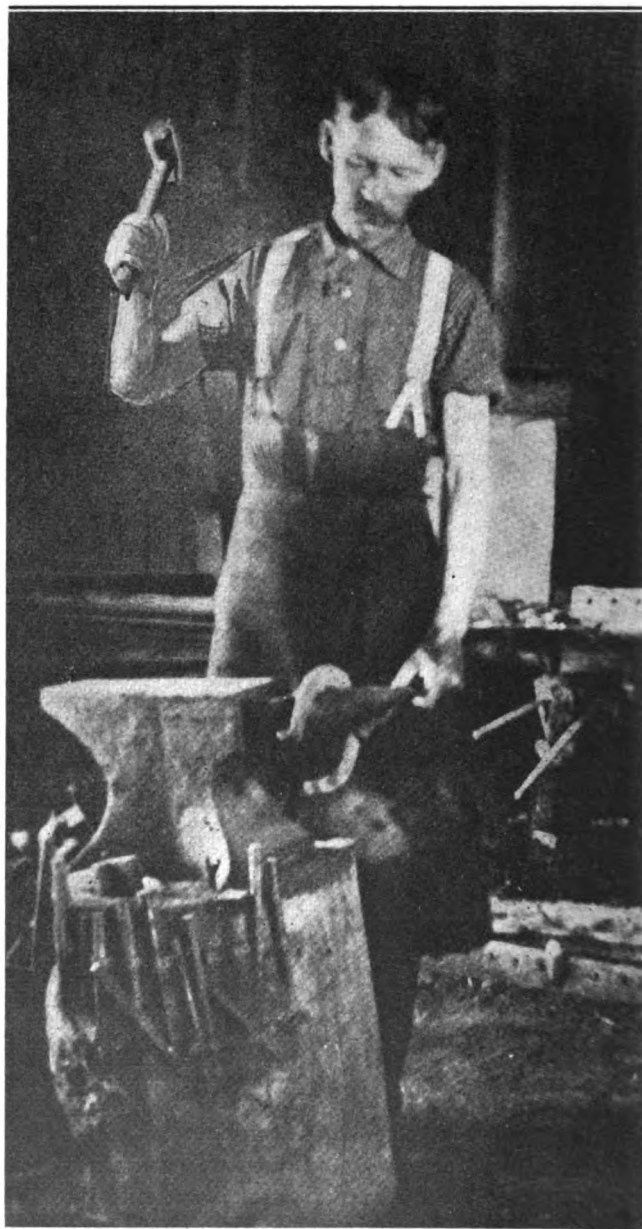
David Wilson, the owner and manager of a blacksmith shop and garage, claimed that Frank Cross a baker, was indebted to him for \$400 for services and material furnished during 1915 and 1916. Cross was frequently requested to pay his bills but he paid no attention to these requests. Then one day Cross brought his automobile to Wilson's shop and gave instructions that some repairs be made. The repairs were made, but Cross was notified that he could not have the automobile until he paid his debts. In other words, Wilson held the car as security for the payment of the bill. Cross did not deny that he was indebted to Wilson for this amount, but he claimed that the automobile was exempt for debt. He accordingly started suit to enforce Wilson to release the car. The Court, however, held that Wilson was

entitled to hold the automobile as security, the same as any other personal property, and that if Cross refused to pay his just debts, Wilson was entitled to dispose of it in order to satisfy the debt. The balance, if any, from the sale was to be given to Cross.

The exemption laws differ in the various states. Every state has its own exemption laws, which are changed as often as the legislature may see fit to do so.

The automobile is not exempt from execution anywhere, unless it comes under the head of tools of a man's trade; that is, an automobile used for pleasure would probably not be exempt, whereas some kinds of automobiles used as cabs or as delivery wagons, might be exempt, not under the name of "automobile," but as a part of the necessary tools of one's trade to enable him to make a living.

The law has been tested in many cases, so there is no doubt as to its constitutionality.
S. S., New York.



MR. W. J. MCCORMICK OF ILLINOIS, BUSY AT THE FORGE



Painting the Automobile—4

From the Viewpoint of a Practical Vehicle Painter

M. C. HILICK

IN PAINTING the car, *without removing the old paint*, the work involves some special features which must be studied closely if the finish is to be made lasting and value received is to be rendered. Many of these jobs should rightly be burned off or have the old paint and varnish foundation taken off with the paint and varnish remover. But the owner elects to have the new finish put directly over the old, taking it for granted that the new will last as long as the car anyway in which case he will be the gainer. In any event it will be necessary to cut the old paint down closely with sandpaper, using for this purpose No. 1 paper. Perform this work after first washing the car thoroughly, making sure to remove all grease splotches and all traces of varnish, polishes and renovators. These latter, if left on the surface and the painting applied over them, will cause trouble, especially if the surface is checked and fissured, which allows the polishing and renovating mediums to penetrate the cracks. From these fissures the material works out through the newly applied finish, softening it up and causing it to flatten and deaden and lose its gloss. If not removed before painting, even when the surface shows no fissures, the new finish will not dry, and will lose its gloss quickly. In a little booklet recently issued, more than 200 painters in all parts of the country gave practically a unanimous opinion relative to the destructive effects of the polishes and renovators when used upon the varnished surface of the automobile. One method of cleaning the polish from the surface consists of washing first with gasoline, then with turpentine, and lastly rubbing with water and pumice stone flour. It will be noted that this is somewhat expensive and after examining the surface and finding the presence of the polish the painter should make a charge of anywhere from \$5 to \$10 per car for this work. At the present rate of labor it will cost that much.

If the surface is cut up with deep cracks it will need some filling work applied, and this may be done in several ways. First the surface may be coated with an application of elastic finishing varnish let down a little with turpentine.

Lay the material on just as the regular varnish coat is put on, and

allow plenty of time for it to dry. Next apply a coat of thin lead and lampblack, used to make a slate color, and mixed in one part of raw linseed oil and three parts of turpentine. Apply this to the surface with a camel's hair brush, laying on a smooth, fine coat. When this has dried hard, soften up some hard-drying carriage putty by adding a few drops of turpentine until the pigment will work nicely from the point of a half elastic. 2½-inch scraping knife, and with this go over the work, facing up the surface with the mixture. Do the facing or glazing smooth enough to lighten the work of sandpapering down in case it is preferred to do this rather than to apply roughstuff over all and then rub with water and artificial rubbing stone. With a little exercise, this glazing or facing-up work can be performed very smoothly, and where a moderately cheap job is desired it will afford a very good finish, and one that will wear durably. In the event of a better job being asked for, it will be the practice to apply anywhere from two to three coats of roughstuff directly over the facing-up mixture.

Another method is to clean and sandpaper the surface and to then apply a coat of gold-size japan. This will go right into the cracks and seal them. When the coat has dried thoroughly rub the gloss off with a block of rubbing felt or some curled hair. Then putty glaze as above described.

Still another method is made up of a mixture of equal parts of roughstuff filler, dry white lead and whiting mixed to a heavy paste in equal parts of rubbing varnish and coach japan. To this mass is added one-half the quantity of rye-flour paste, stirring the mediums thoroughly. Apply with a partly-worn oval or round bristle brush and when it has set to the right consistency knife it in with a broad blade scraping knife. After a few days it may be rubbed down with a block of rubbing brick, using equal parts of raw linseed oil and turpentine for a dipper. This will produce a good looking and strong wearing base for the finish. It is understood, of course, that filling the cracks is only a make shift, and that it does not take the place of taking off the old paint foundation. It often furnishes a good and durable wearing finish, and enables the vehicle owner to get all the service out of the job that he desires at an expense of one-third or

more less than the burned off job would cost.

There is another class of cracks which may be taken care of in a simpler way. These are the fine checks that run across the finish without going in deeply. Rubbing the finish down with water and pumice-stone flour and applying a coat of color, then varnish-color, and then an extra coat of rubbing varnish, will in almost all cases do away with these fine checks. When they appear upon surfaces which come in for a coat of varnish only, it will be necessary to rub the surface down with the water and pumice-stone flour and then, as above stated, give an extra coat of rubbing varnish. When the work has been sandpapered or rubbed down, as the condition of the surface appears to warrant, it may be brought along with one coat of color, one coat of varnish-color, one coat of clear rubbing varnish, and then finished with a durable wearing finishing varnish.

The striping should be applied directly over the varnish-color, after this coat has been rubbed with a sponge moistened with water and dipped into pumice stone flour. This will serve to knock down the gloss and cut away the dirt nibs, and condition the surface generally. It is a good practice to run quite a generous display of lines about the outlines of the body in order to relieve any surface defects or general roughness. Lines of gold, carmine, some of the light yellows, and lighter or darker lines of the field color make attractive color effects, and for old work from which the paint and varnish has not been removed they help to relieve conditions immensely.

Upon surfaces which show few if any checks, but have badly worn varnish films, with the color faded and worn, it is the practice with most painters to first sandpaper the old shell down and then apply a coat of white lead and roughstuff filler mixed in equal parts, by weight, the liquid mediums being rubbing varnish and coach japan, half and half, until a heavy paste is produced; after which the mass is thinned to a brushing consistency with turpentine. Surface defects are puttied on this coat. After twenty-four hours the putty may be coated. This coat should now be straight roughstuff and probably three coats will be needed to give the right bulk and substance to rub properly. Right here, to correct a misunderstanding which often exists with reference to the amount of roughstuff it is neces-

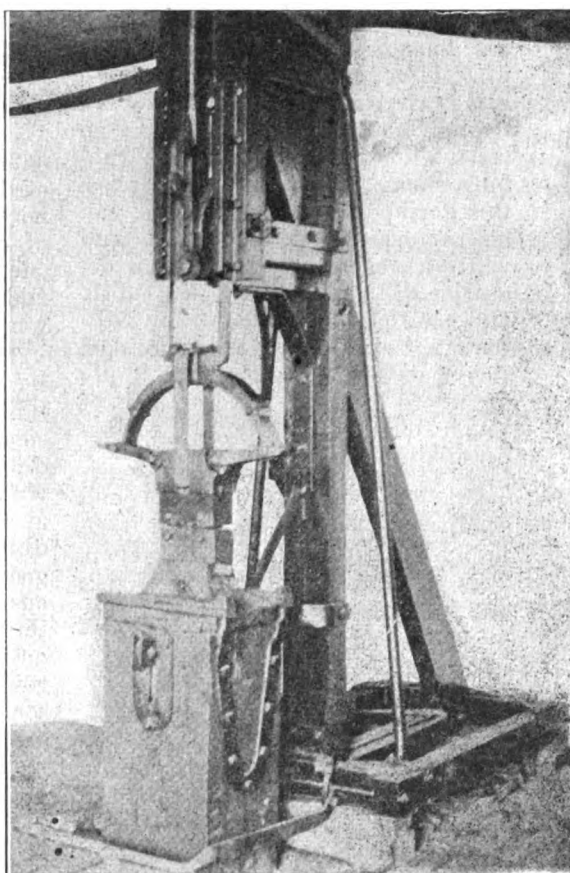


sary to use, we would say that in all cases enough roughstuff should be applied to enable the workman to rub the surface to a level condition without unduly stripping it in places of the needed body of pigment. Where there is an inadequate supply of roughstuff there are certain places stripped very close while still other places carry a strong depth of pigment as the workman endeavors to get a uniform levelness. In other words, as the effort is made to rub the surface elevations down to the level of the low ones, the former are stripped dangerously close while the latter have plenty of depth of pigment. If the surface is perfectly smooth and level to start with this danger is scarcely to be considered, but when it is otherwise the high places are likely to be stripped badly while trying to get the low places rubbed down to the needed condition. The quantity of roughstuff, then, must be reckoned after the surface conditions have been studied. Some jobs will go nicely with two coats of roughstuff while still others must have at least four coats.

After the jobs which must have roughstuff applied to them to eradicate the defects and hide the checks, etc., come those which will go very well after rubbing the old finish with water and pumice-stone flour. This rubbing will need to be well done, and preferably a $\frac{1}{2}$ -inch perforated rubbing pad should be used in the rubbing. This will help to get the surface down smooth and fetch off dirt nibs and roughage generally. Perhaps some surface defects will need touching up and puttying. The touching up with a little lead paint seasoned with enough raw linseed oil to bind the pigment to the surface should be done before any water has been applied to the work. When the surface has finally been made ship-shape and receptive to further treatment, it will need dusting off and a coat of color applied. This color should carry one part raw linseed oil to four parts turpentine. Directly over this color apply a coat of varnish-color. For a moderately priced job one coat of clear rubbing varnish may be made to suffice, but while the job is in the shop it had best be given an extra coat of rubbing varnish even at the cost of labor and material. It will pay the car

owner ultimately and will give him a better looking job from the start. This work will also look cleaner and better by applying some striping effects of a color that will best act in harmony with the field color, the understanding being that gold looks fine upon any color.

The touch-up-and-varnish-job comes after the color and varnish one, and this doubtless gives the painter more trouble to get the right effects and finish than any of the other classes of work. First, the sur-



A WELL-BUILT POWER HAMMER DESIGNED AND BUILT BY MR. ANTHONY ZEMAN OF IOWA.

face must be thoroughly clean. Then it will, as in the case of the one coat of color, need a very good rubbing with water and pulverized pumice stone. After this process comes the work of touching up the splotches of diseased color, the color chipped off, and the defects in general. The main thing in this work is to have the touch-up color matched to the shade of the old color which is not an easy thing to do. Get the match with a color carrying enough varnish to insure the color drying with a gloss. Then, in the work of touching up, touch just the spots actually needing it. To do this in the best manner possible use a lettering pencil, and blend the edge just enough to smooth down the break between

the new and the old. The least touching possible, consistent with the real needs of the surface, will be found to work to the advantage of the painter. No matter how close the match there is quite likely to be some variation in the shade between the old color and the new. One thing in the matching of the color: Aim to have it dry precisely as it looks mixed ready for use in the container. Then if it carries enough varnish in its composition to hold a decided gloss when dry it simply remains for the painter to get the correct match. Many good workmen are able to get the match right enough as the color swims in the container, but in drying it goes off shade, and this action the addition of varnish is intended to correct, and in fact does correct. The chief trouble with many really efficient color matchers is that they find it impossible to control the drying process and to apprehend the amount of off shade the pigment undergoes during this process. With a good gloss established in the match color it is able to reflect more light than is absorbed and thus comes out dry in a perfectly unchanged condition. This is really the long and the short of the matching matter. Not many of these so-called-touch-up-and-varnish jobs can be made to go in a presentable condition with the application of a single coat of finishing varnish. The surface is for the greater part dry and absorbent, and the one coat of varnish is gradually taken in with a resulting loss of lustre and body. By applying a

coat of rubbing varnish this difficulty is overcome. The rubbing varnish being less elastic and drying faster and harder, it is able to hold its body on the surface in larger volume and to give the finishing varnish the required support to keep it in full body and brilliancy above the color and right where it can give the full protection to the undercoats. For this class of work it is desirable to use a medium-quick, hard-drying body varnish that is strictly serviceable and capable of standing a lot of abuse, which most car varnishes have to do. Make sure in these jobs that joints and corners are touched up and made secure from dirt working out in the finishing coat.

(To be Continued.)

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OPPORTUNITY IN AUTO WORK

The automobile industry has assumed such gigantic proportions that its greatness and future possibilities are not usually given the consideration they deserve. With some three million or more automobiles already in use and the number increasing at an average rate of over a million a year it is therefore, very hard to make a forecast of what the future will develop.

Within the space of less than twenty years we have seen the automobile advance from a mechanical curiosity to one of the practical necessities of business and the enjoyment of life—a necessity, which today, none of us would care to dispense with.

And now comes the farm tractor, in the wake of the automobile; a machine that will unquestionably revolutionize farming and farming methods not only in this country but in Europe as well. Not only will the farm tractor do these things, but it is going to put the tiller of the soil in the class with the manufacturer, rather than among those who labor with muscle alone.

The very rapidity with which this enormous business has grown—is growing and will grow—has brought with it a lack of competent workers.

There is not a great deal being done toward educating car owners to a point where a skilled man is not needed occasionally and among the great majority of motor car and tractor owners and operators, this day never will come. The trouble that comes at an unexpected time—the occasional puncture, failure of the electrical equipment, and the like—all these tasks are more easily done by the man who knows just how and the owner is invariably willing to pay the laborer who is worthy of his hire, and he has been educated in the past, to expect to pay the laborer well; better in fact, than for a similar amount of time and work in any other line.

COOPERATION WINS.

It ain't the guns nor armament
Nor funds that they can pay,
But the close cooperation
That makes them win the day.

It ain't the individuals
Nor the army as a whole,
But the everlastin' team work
Of every bloomin' soul.

—Kipling.

PUT YOUR SHOP ON THE MAP

When it comes to putting forth effort to bring in new business the smith finds that his hands are, to a large extent, tied. Few of the usual methods of advertising are within his reach and the altogether too common attitude is to sit down and wait for business to come in of its own accord, meanwhile kicking about bad luck.

There is one form of business-bringing advertising that no smith can afford to overlook and that is the kind commonly described as "putting your place on the map" or, in other words, making your location stand out from its surroundings in such a way that it cannot be missed or ever mistaken for that of a competitor. This means making the front of your shop attractive, making the most of the space that you have by displaying a sign which will greet everyone who passes your shop and, if possible, one that will convey your message both day and night.

The advertising space of your shop is just as valuable to yourself as it is to a patent medicine concern and DON'T, for your own good, allow your shop to be the common property of every bill poster and sign tacker that comes along.

Don't give money to agents unless you are sure who they are. Every authorized AMERICAN BLACKSMITH agent will gladly show you his letter of authority to take your order. When in doubt, send money and order direct to Buffalo, N. Y.

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WHAT THE FARMERS BOUGHT AND ITS MEANING TO YOU

Farmers purchased nearly fifty per cent. of the autos and trucks made during 1917—a total output numbering almost two million motor vehicles.

That fact signifies more to the blacksmith and general repair field than any other outstanding feature of the trade at the present time.

The automobile, truck and tractor are today the greatest factors in the transportation and agricultural problems of the country. When these machines are repaired, the blacksmith and general repairman—keen, alert-brained with a fundamental knowledge of mechanics that is second to none—will do this work.

Seventy-two per cent. of the general blacksmiths of the country are already doing automobile work. These practical mechanics have seen the writing on the wall and are repairing automobiles, trucks and tractors. And with the great number of new owners, particularly those in the country districts, the blacksmith, auto and tractor shops will get more of this work and will be compelled to do more of it.

Inseparably linked with this opportunity for repair work on automobiles, trucks and tractors, is the opportunity for selling accessories and parts. Motor vehicles need tires, gas and oil. They are constantly in need of parts and accessories, and the blacksmith, auto and tractor shop is the logical place from which these supplies should be sold to the auto, truck and tractor owner.

H. O. Bernhardt

*Editor, American Blacksmith
Auto & Tractor Shop.*

The Ideal Automotive Sales Service Shop

By C. L. WHITE

YOU notice the title reads "the ideal," — well, to be correct, it really should read "my ideal," for how can anyone discuss the ideals of others? You will also notice that we use the word "automotive"; which we do because the service men of today are expected to "fix up" all kinds of self-propelled vehicles, — including automobiles, motor trucks, motorcycles, and soon, many tractors, and after the war the stray aviator will expect almost any well equipped shop to tune up his engine and help him on his windy way.

Now, to get back to that word "ideal"; don't think that because we use this word that we believe that our plans, designs and equipment suggested will necessarily fit your needs and conditions. If this little article helps some fellow to work out his own plans, designs and equipment to fit his own ideas and ideals, it will not have been in vain.

To begin with, some one has said that the most important part of an organization is the MEN who are really doing the managing, supervising and routine work of the shop; the next in importance is the machinery and tools, etc., and last comes the building. We believe this to be correct but are going to start our discussion in the reverse order, for we must have our building before we can install the tools and other equipment and hire the men to operate it.

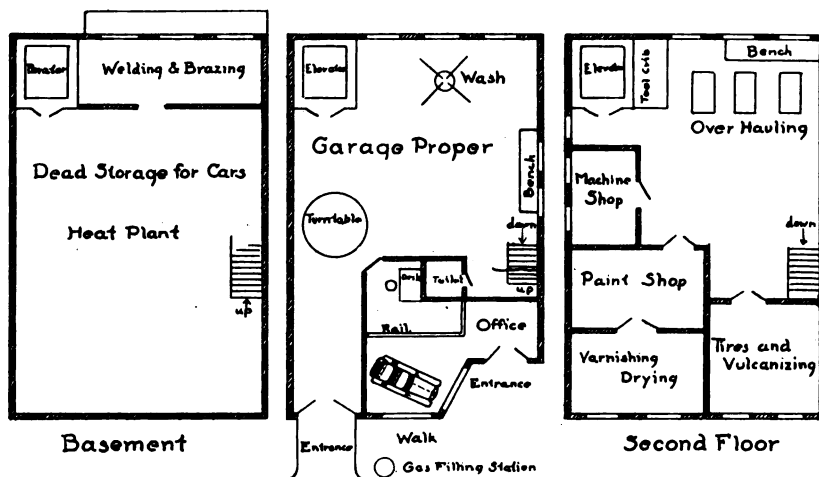
It is understood that in the majority of cases the ambitious man entering the automobile (or automotive) business does not have the ready capital to invest at once in a brand new building and equipment and must, perforce, establish himself in

whatever building seems to best fit his purse and those local conditions that it is natural to feel are not like those of any other place on earth.

As this first article will deal with the building, we will leave to later installments the questions of tools and equipment and management.

The first thing to consider in connection with the building is its location. It must be located on a street where there is considerable traffic of the kind that needs automobile service, and in these days that means practically any street where traffic is heavy. Next it is best to locate where the people often leave their cars, to do shopping or the errands that bring them down town or into the city. It is also well to locate where there are few nearby residences, this will reduce the possibility of complaints when it is necessary to work over-time or when engines are tuned up late at night, etc.

The next thing to consider is the question of construction materials and that garage or service man is making a mistake who does not build of some fire-proof material such as concrete, concrete blocks, brick, etc. The decrease in fire hazard as well as the smaller fire insurance rates will more than pay for the somewhat greater cost of the building.



PROPER PLANNING OF THE SHOP SAVES UNPROFITABLE STEPS

The garage should be well lighted and particularly so in the paint shop and upstairs rooms and if it is altogether possible, and the concrete building lends itself particularly well to it, continuous steel sash should be used. In this manner the greatest possible amount of natural illumination will be available. One of the most common faults in garages and repair shops is the lack of illumination.

Now comes the problem of how many stories, and whether the basement should be entirely excavated to provide extra space for car storage. This brings up the questions of available property, value of property, taxes, etc. It is also necessary to determine whether there is much transient or storage trade available. If the city or town is located on a national or trunk highway and if there is a hotel near the proposed location of the garage or shop, there is quite sure to be some transient trade, the amount depending on whether it is already well provided for. Transient trade requires easy entrance and exit and this means that enough ground floor space to accommodate it should be provided.

A scientific analysis of all the factors that enter into the question, the number of stories is beyond the scope of this article. A competent architect and estimator should be consulted if necessary to arrive at a decision.

For the purposes of the present article we will assume that our "ideal" business is to be well balanced, with some transient trade as well as the sales, service, overhauling and repair departments. We will then provide a two-story concrete service building with a full depth

basement for dead storage, etc.

One of the most important requirements in the design of such a building has to do with the centralized control of the sales and transient service, in order that one man may handle the entire thing during noon hours, and nights when the manager and other help is often away.

In the "ideal" ground floor plan, we believe we have a lay out that gives such control. It will be noted that one man can see the entire shop from the office and that a door opens directly into the sales room, which not only controls sales over the counter but also controls the exit and entrance of the garage and the sale of gasoline, oil, etc. A curb supply station can also be watched and attended to by passing through the large doors or through the small door beside the large doors. The partitions for the office and sales rooms should be glass about seven feet from the floor. Thus some light can be had from the front in case no windows can be put in the sides of the building. In case entrance can be effected from the side, the turn-table will not be necessary. In case one man is on duty the entrance door could be opened electrically upon signal from the car desiring to enter.

Only repair work of an emergency or off-the-street nature is done on the ground floor shop.

The basement is used for dead storage, the heating plant of the building, for oxy-acetylene welding and brazing, and for tire vulcanizing and repairing. See figure.

The second floor is used for general overhauling of cars, a machine shop, and a paint shop as shown.

A second installment will take up equipment, tools, etc.

Granite Tool Sharpener

Le Roy Kenneth

Sharp tools are the first requisite of stone-cutters and sculptors in the monumental trade. Until now it has required a blacksmith to keep the tools of about twelve granite cutters in condition. At Barre, Vermont, the center of the monumental trade in this country, several tool sharpening machines have been tried and are proving successful. They enable two blacksmiths on a machine to care for the tools of about one hundred and twenty-five cutters.

Tools used to cut granite receive very hard usage and must often be reshaped as well as sharpened. The machine that is revolutionizing the blacksmith's part of the industry is a combination of trip-hammer, emery wheel and endless chains of plates and brine buckets.

The dull tools are placed on an endless chain of iron plates, the dull edges against a gauge, and as the chain travels the tools are carried through a furnace burning kerosene mixed with compressed air. The

heat is very easily regulated by the amount of oil used.

As the chain brings the hot tool from the furnace the sharpener grabs it with his tongs and the several angles on the face of the trip hammer enable him to draw it out to the desired shape and thinness in only a fraction of the time required by the old hand anvil method. A stroke or two on the emery wheel at his side insures a sharp edge and the tool is ready for tempering.

To temper the tools uniformly was the big problem. This is met by a series of small perforated iron buckets on another endless chain. The tool still hot—it has been in the smith's tongs only a fraction of a minute—is dropped point down into one of these buckets. It is carried under a stream of brine that fills the bucket, the brine runs out slowly through the perforations, drawing the temper to the edge, then the tool is carried by the bucket under a stream of fresh water and cooled and delivered to a sorting bench.

To insure even tempering the operator must time his work with the machine, as long as his movements synchronize with the machine the finished tools are of an even temper.

The machine has already supplanted the hand sharpener in many of the largest monumental plants and the smaller firms are pooling their tools and installing community machines to serve several small sheds.

The operators, all blacksmiths before the machine was introduced, while admitting the quality and speed of its work, find it hard to become only a link in a chain, and express regret at the passing of the old way when each tool was an individual problem, each chisel a chance to show their skill.

Carbon—What it is and What it Does

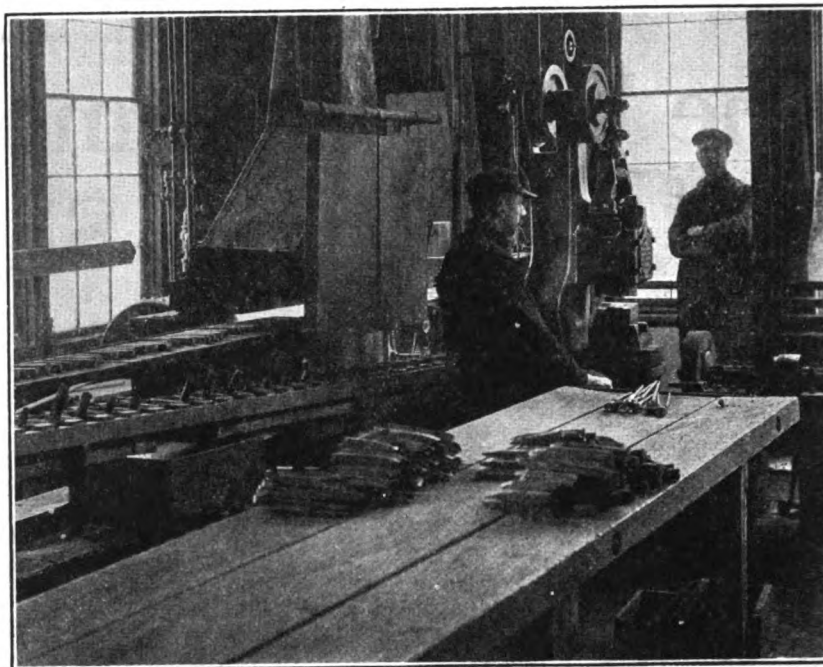
Carbon is responsible, perhaps, for more motor troubles than all other causes combined; in fact, it

is one of the worst and most frequent causes of motor complaint. In many cases the presence of carbon is not suspected and the difficulties that result from a good, healthy deposit are generally looked for somewhere else than the real seat of trouble.

When the motor becomes loaded with carbon it seems to lack power, does not respond to the throttle, particularly on a hill, and is sluggish in action. When these things happen the driver makes a few torrid remarks, about carburetors, gasoline, the manufacturers and everything else he can think of.

These and a few other little things like loss of compression, pre-ignition, knocks, over heating, etc., are all the direct results of carbon having formed in the engine cylinders.

To begin with, carbon is an elementary substance and unlike most substances it cannot be analyzed and its composition determined, for the good and sufficient reason that carbon is carbon—an element. This form of carbon; coal and diamonds are other forms in a crystallized form, is nothing more than soot that forms from the burning oil that is introduced into the cylinders. There are several sources of carbon but the most common is that caused by using too much oil or a wrong grade of oil. A very rich gasoline mixture from the carburetor will also result in the deposit of more or less carbon. As the cylinder walls are generally lubricated by the splash system the supply of oil cannot be controlled very well. In this way worn piston



MACHINE THAT SHARPENS GRANITE CUTTERS' TOOLS

rings permit too much oil to enter the cylinders and—more carbon. There are other and minor causes of carbon but the ones mentioned can generally be considered as the most common causes.

The formation of carbon cannot be entirely prevented but it can be reduced to a very great extent by certain precautions, not the least of which is the use of a proper lubricating oil. Too much oil in the crank case will generally cause a dense smoke to issue from the exhaust pipe when the engine is running and it might be well to mention here that any unnecessary smoke from the exhaust can be considered that the engine is getting more oil than it needs or that the fuel mixture is too rich.

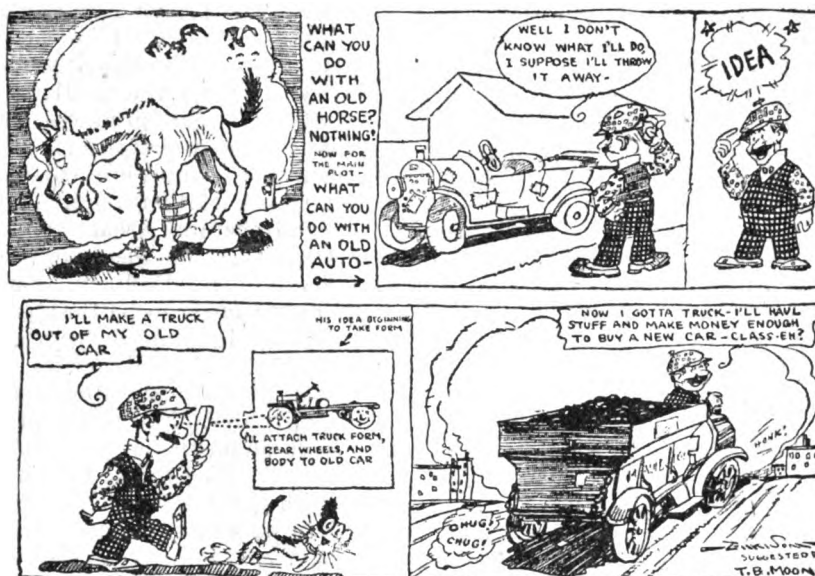
A good, heavy accumulation of carbon, piled up on the head of a piston and on the cylinder head will, after the engine has been running for a short time, become red hot and fire the explosive mixture in the cylinders before the proper time. This causes a knock that is particularly noticeable on a hill. When the ignition switch is thrown off the engine does not stop as it was not depending on the spark at all but the red hot carbon in the cylinders was exploding the mixture before the spark occurred at the spark plug terminals.

If one of the priming, or compression cocks, is opened while the engine is in operation and a red or yellow flame is noticed it is an indication that the gasoline mixture is too rich. The flame should be blue.

As mentioned before, carbon will occur with the best of care but the trouble can be greatly reduced by pouring a small quantity of kerosene into each cylinder and allowed to stand over night, about once a week. The cylinders should be hot when the kerosene is poured in and after closing the priming cock, turn the engine over a few times in order that the kerosene will be able to work to all parts of the cylinder and the piston rings where there is likely to be any carbon. The use of kerosene in this manner does not, however, prevent the formation of carbon nor remove deposits already formed entirely. It does soften up the carbon to such an extent that more or less of it will be blown out through the exhaust.

If care has not been taken to avoid the formation of carbon and a heavy deposit has formed, it is quite likely to remain unaffected by the kerosene treatment. The old method of removing the carbon from the en-

WHAT CAN YOU DO WITH AN OLD AUTOMOBILE?



—Omaha Daily News

gine was to remove the cylinder head and then scrape the carbon from the cylinder heads, pistons and valves. There are some instances where it is only possible to manipulate the scraper from the outside of the cylinder through the valve caps. In many of the older models it will be found that it is only possible to work from the outside. If possible, the best plan would be to remove the cylinder head, taking care not to damage the gaskets, and make a thorough job of it. By far the best, simplest and most economical method of carbon removal is to burn it out with oxygen.

Any repairman with a welding outfit can do this work and carbon burning will be taken up fully in the April number.

First Aid Suggestions

With the fact that it is beyond the province of human endeavor to avoid all accidents, it would seem advisable to offer some practical "First Aid" suggestions that can readily and quickly be applied to a less fortunate fellow to whom an accident has befallen.

The following suggestions are applicable to the most common forms of accidents. As it is the duty of everyone to know what to do for the injured, you should study these rules carefully.

BRUISES AND BURNS—Cover with any kind of clean grease or oil; wrap parts with cloth to keep out the air.

CUTS—Clean out the cut with strong, warm salt water, to which has been added a drop or two of carbolic acid; draw edges together with strip of plaster and bind with a clean bandage.

DISLOCATIONS—Don't attempt to set dislocated parts. Send for the doctor. Place part in position easiest to the sufferer.

ELECTRIC SHOCK—Apply cold to the head; mustard plaster to the back of the neck and over the heart; wrap patient in

warm blanket and resort to artificial respiration. If there is a pulmotor in the neighborhood, send for it.

FOREIGN BODIES IN EAR—Syringe with plain, warm water. If an insect, have patient lie down on opposite side and fill the ear with warm water. The insect will float out.

FOREIGN BODIES IN EYE—Pull down eyelid; search out the object and remove it with the corner of a fine handkerchief, or with a little brush made by wrapping the point of a toothpick with absorbent cotton.

FRACTURE—Place patient in reclining position, bind limb in pieces of thin board, made wet with arnica or salt water, until the doctor arrives.

SPRAINS—Perfect rest. Apply ice water cloths to joints; finally use gentle motion and liniments to prevent stiffness.

SAFETY FIRST — DON'T TAKE A CHANCE.

Does the Blacksmith Count?

WILL BISHOP

In a previous article, I think I made assertion that the blacksmith is one of the most important cogs in the machinery of progress. For fear that I did not, right here is where I declare myself along that line, and ask every brother that reads this to take it seriously—to invite himself out into the wood-shed and hold a confidential talkfest with himself—give himself the once-over — and actually pry himself loose from his real, honest-to-goodness feelings on the subject which is the title of this article.

Not only in peaceful progress is the smith a big factor; in the great army of civilian soldiers that arm, equip, and feel the fighting man, the blacksmith stands outranked by none in quantity and quality of service rendered. From the earliest history of the race down to the minute you

THE AMERICAN BLACKSMITH

read this, we, the grimy, sooty-faced, calloused-handed, iron-punishers have played—and are playing—a big part in the winning of every victory, whether of peace or war, that has been won. We rank high in the supply department of every army that ever marched. Without the weapons fashioned by the lusty blows and alert brains of the sons of Vulcan, the sons of Mars would be reduced to the level of animals, fighting with tooth and nail and fist, where the army with the physically strongest men would win all the victories. We are the balancing force in that oldest and greatest of all games—War. The products of our hands and skill make the little soldier just as effective a fighting man as the giant. From the time when our cave man ancestors slugged out rude spears and axes with anvil and hammer of stone, to the present age of 16-inch guns, crawling land-forts—the tanks, great floating dreadnaughts, and soldiers of the air, our hands have been heavy in every war in proportion to the energy and skill we have displayed in forging weapons for our fighting brothers.

Give that time to soak in, brothers. And while it is soaking, remember that there are hundreds of different kinds of weapons used in this, our modern war; each, in its way, indispensable to the cause of victory. Don't think that you, because you are not hammering out swords and bayonets, are not making implements of war. You, Plow-sharpener, are sharpening a weapon as effective as the sword! You, Wagon and Auto Repairer are keeping in trim running order the coaches of victory! You, Horseshoer, are shoeing the cavalry of the world! All of you, whether small shop man or large, journeyman or boss, railroad or ship-yard shop—all of you are forging weapons that shall determine the issue of this war! Ever think of that? If you haven't, you'd better clean the carbon out of your think-cylinder and crank 'er up again.

Napoleon once said that an army marches and fights its way to victory on its stomach, or words to that effect. Who feeds the armies of the world? Any school boy can answer that question, but lots of grown-ups will miss the significance, and fail to give credit to the sweating, slugging blacksmith whose labor makes and keeps in repair the implements which enable the farmer to feed our fighting Sammies. Yet, to dig down beneath war's surface conditions, we find the work-a-day smith is indeed a

mighty force, backing with his toil and sweat and brains the hosts who are knocking the big "I" out of the Kaiser. He—the Blacksmith—is the man behind the farmer. He is the man whose sweat produces arms, ammunition, and equipment. He is the man whose handiwork makes adequate transportation facilities possible. Everything that rolls on wheels or floats on the water, from baby-buggies to Pullman coaches, from motor boats to battleships, requires in the building the services of the blacksmith. And armies *must* have means of transporting, both on land and water, large bodies of men and vast quantities of supplies and equipment. Fact of the matter is—the smith is the strong right arm of the industrial world; and to chop him off would paralyze almost every industry under the sun.

Now brothers, it's a proven fact that we *do* count—and count largely—in the big things men are doing in the world. What are we doing as individuals to help our Sammies and their allied brothers to rid the world of the Prussian menace? Do we put our hearts into our work with the realization that every lusty blow we land on the glowing steel is a moral and material force behind the blows with which our boys are smashing the "kultured" helmets of the Kaiser? Do we strive with both brain and brawn to increase our efficiency? In a plain, blunt, straight-from-the-shoulder question: do we back with our brains and hearts and hands and sweat-won dollars the cause which our soldier sons and brothers are backing *with their lives*? If we are doing so, our part in the final victory will be second to that of no other class of men this side of the trenches of France! If we are not, we are men utterly unworthy—unworthy of a place in the ranks of our time honored craft; unworthy of the citizenship paid for us by the lives of men such as are now preserving it for us "somewhere in France."

We can't all be soldiers or sailors—though thousands of our craft are serving in each branch. Many, like the writer, are too old, or otherwise unfit. But we *can* do our bit in the important place we occupy behind the firing lines. And we are doing it! In the village shop; in the city shop; in factory, mine, and lumber-woods; in the rail-road and ship-yard shops; in every place where men labor and industry throbs there you will find the blacksmith doing his bit as an important working part of the

great machine that is sweeping from the streets of the world the befouling rubbish of Kaiserism. Steady and patient and cheerful; unheralded, "unhonored and unsung", he is cutting from the chain of the universe the defective link of militarism and forging into it the link of Democracy and Peace.

Do we count? Ask your self, brother; for it is in the work of our own hands, and in the sentiments of our own hearts that lies for each one of us the answer.

Workers For the Shipyards

The Paramount Need of the Hour.

Because ships are the primary factor in the winning of this war, and because the construction of these ships depends, and will always depend, upon labor, there has been created an organization of workmen known as the United States Shipyard Volunteers, enrolled under the Public Service Reserve. This organization is composed of workmen who are willing to give a good day's work for a good day's pay; workmen who are not asked to sacrifice present positions to rush madly off to shipyards which may not be able to accommodate them for the moment, but who stand ready, when called upon, to do a particular job for a particular wage in a particular place, and who have enrolled themselves in this organization so that when needed they may be readily reached.

The need of the nation is great. The Shipping Board has the money, the housing of men is being arranged for, the yards are being completed and the materials provided. All that now is lacking is the knowledge of the need that will inspire loyal and efficient mechanics to enroll for service in the yards, not in a fashion to disrupt the business of the country through the robbing of present industries. On the other hand, it is planned to make a careful selection of men whose places can be filled without hardship, and who when called upon to give up the jobs they now hold will have waiting for them definite positions at definite wages in definite yards.

Men actually working in the shipyards will be placed in the deferred class in the draft.

It is urged, therefore, that mechanics go at once to the nearest enrollment agent of the United States Public Service Reserve of the Labor Department, or to the local enrollment agent of his State Council of Defense, and register themselves as willing to work in the shipyards.

How Two Men are Increasing Their Business and Profits

Two interesting articles from men in different parts of the country with progressive ideas. They differ from each other as to means and methods, but both are increasing their business and their profits in the Blacksmith and the Auto Repair shop.

SOME eighteen years ago I started a small shop in a town of 500, where two other shops were already doing business, but being a good workman, and having certain ideas on how to handle the business it was not long until my competitors were on the defensive.

I made a thorough study of my customers' needs, who were mostly farmers, and decided that their two greatest difficulties were with "sticky" plows and broken castings. Accordingly I became as skilful as possible in these particular lines—plow hardening and the brazing of broken cast iron—in fact I specialized on these two lines and it was not long until I was being referred to over the countryside as "the blacksmith who can make your plow scour, and who can mend broken castings without straps or rivets."

Soon I had the other shops "on the run" and had practically the entire blacksmithing trade of the whole community, but after a few years of hard work, I realized that I was not making anywhere near the money that a man of ability should earn, as I was limited to what I could earn and my profits were as a result limited.

I noticed that while I was sweating over a dollar job that the implement dealer who had never bothered about learning any trade and wore a white collar all the time, was making a hundred dollar sale.

I also observed that many a tool that he had sold had to come to my shop to be sharpened or adjusted before it could be used and nearly every day my customers would ask of me "which is the best plow, Jim," or "what wagon is made of the best materials" or "which would you recommend?"

After I began to think of some means to increase my business and my income it didn't take me long to decide on farming implements, as I knew that I was regarded as an implement expert (as most blacksmiths are) and I also knew that the black-

smith gets the first opportunity to sell to the farmer with the worn out tool while he is repairing the old one.

"But how to start in the implement business without considerable money?"

That is the question that a good many blacksmiths are asking themselves and so did I. I started by ordering a few fitted plow shares, lister shares, subsoilers, fitted shovels, sickle section heads, ledger plates, pitmans, boxes, etc. The public was accustomed to buy these articles at the hardware stores and then bring them to my shop to have them put on.

When a farmer came in with a sickle to fill and had not yet bought his sections I would call his attention to the fact that I had them in stock and of course made the sale and the same plan applied to the ledger plates, shares and other goods and it was not long until I was re-ordering in large quantities.

Next I took the agency for a popular gas engine and kept one on hand all the time and I never missed an opportunity to show it or to demonstrate its merits. The result of this move was that I was soon selling the most of the gas engines used in my neighborhood. And one great reason why my gas engine business has prospered as it has is that people would rather buy an engine from some one that is able to repair it.

Later tractors made their appearance in our section of the country and I was the first to secure an agency in our territory and make a sale—of course more sales followed the successful demonstration of what the tractor could do for the farmer and now I have a practical monopoly of the tractor business in this vicinity.

My place of business is a cement block building 74 by 80 feet and divided into two parts; one 26 by 80 feet for blacksmithing and repairing and the other 48 by 80 feet for implements. The shop is equipped with power forges, a trip hammer, metal

punch and shears, cold tire setter, power drill, cold disc roller, saw, planer, lathe, calking machine, acetylene welding plant, Barcus stocks, also a portable electric drill besides "scads" of small tools.

—J. W. POKORNY,
Nebraska.

THERE are so many so-called "side lines" for the Blacksmith that it is a rather difficult matter to decide just which one to take up.

Many have tried farm machinery and wagons, but the average blacksmith has not the capital to put in a complete line of these and take the time from his work in the shop to make sales. In the course of a few seasons he has a lot of weather beaten, out of date implements on hand that would not pay the taxes at forced sale and the chances are he has a "plaster" on the shop to boot.

At the present time about 90 per cent. of the shops are equipped with electricity or some other power. All of these shops operating with power have a greater or less number of labor and time saving machinery and tools and these generally consist of a power hammer, drill press, emery grinder and a small circular or band saw.

The blacksmiths having this equipment can, with small expense, be in a position to add to their income materially by adding a lathe and welding apparatus and a few hand tools that I shall mention later.

The automobile nor the tractor has not yet been built that does not require the attention of the blacksmith and there you are. On the car we have springs to make and weld, rods to make and weld, axles to straighten and last but not least the steel rims have to be set the same as wagon tires.

There are a large number of threaded studs and bolts about an automobile that have a habit of breaking or getting lost, and these can be turned down and threaded on the lathe in jig time and the owner, rather than wait anywhere from a few days to several weeks for a new part from the factory is willing to pay a good round price.

As the average blacksmith takes to gas welding like a duck does to water there are a thousand and one jobs on the automobile and the tractor for this apparatus.

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Parts of the tractor or the car that are from four to eight years out of the factory cost about 100 per cent more than for parts of more recent date, in many instances they can't be obtained at all as many of the factories of a few years ago have curled up and died leaving their products as orphans in the cold, cruel world.

As to the hand tools for this work I would recommend a set of *A. L. A. M.* taps and dies, cutting threads from $3/16''$ to $3/4$ inch in addition to the regular set used in the shop. The *A. L. M.* threads are the standard on automobile parts and it will be found necessary to use taps and dies of this variety. A set of socket wrenches of various sizes, a set of adjustable wrenches and a set of 15 degree wrenches. A gasoline blow torch is handy as is also a good breast drill.

The additional stock that is required does not represent much of an outlay and should be about as follows: An assortment of spring lock washers from $3/16$ to $3/4$ inch, cotter pins and stove bolts of assorted lengths and sizes, taper pins and an assortment of *A. L. M.* bolts. A few short lengths of cold rolled shafting from $1/2$ to $1 1/2$ inches is very handy in the shop thus equipped, for making shift rods, transmission shafting and other parts.

The blacksmith with a shop reasonably well equipped to serve his patrons in this manner will have the preference in this line of work for where a part has been broken or lost the owner of the car or tractor will bring it to the nearest person in a position to repair his machine rather than suffer the delay of sending to the factory for replacements and for the additional saving in time he is generally quite willing to pay.

—"OLD TIMER,"
South Dakota.

Handling a Difficult Case of Shoeing

E. H. MALOON

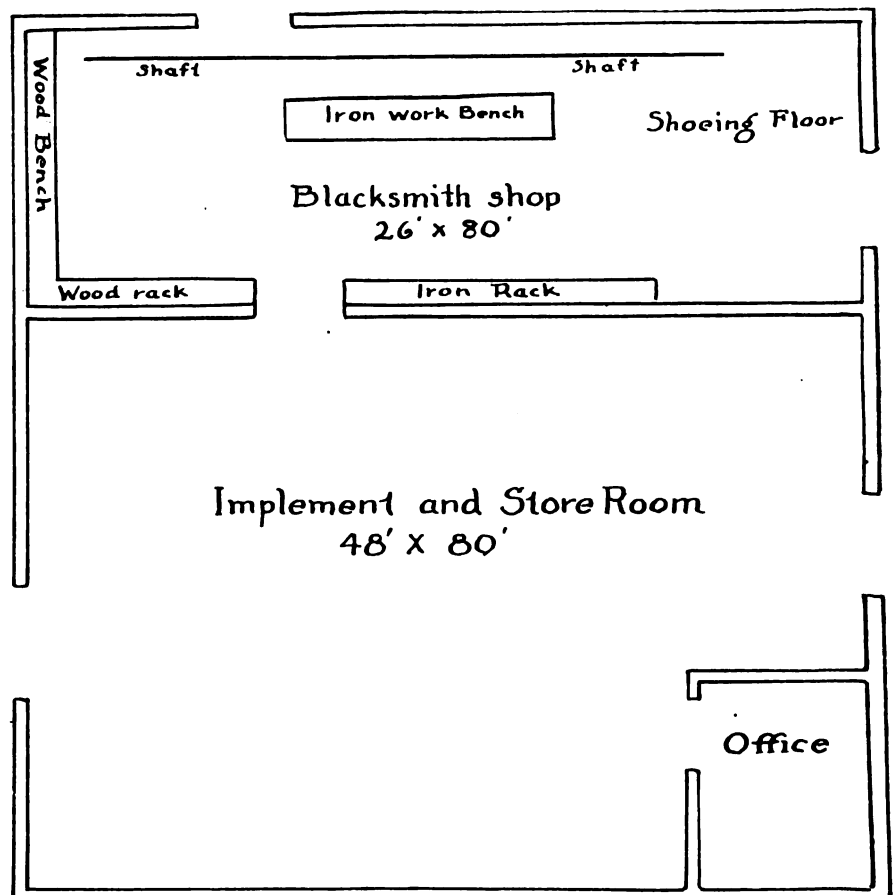
Ironing a Drop-sole Foot.

Some time ago, perhaps two years, a horse dealer brought a green horse into my shop to be shod. My man took up a front foot and pulled off the flake of dead sole that is almost always beside the frog and the blood followed just where that was attached to the sole. We dressed it the best we could and put a shoe on and the horse went off and was sold. That foot never got sound again, the sole began to drop and he has always been lame. Now the question has al-

ways been whether pulling that flake of hoof off had anything to do with his drop sole or not. My opinion is it did not, but that the trouble began before we ever saw the horse. The horse has been to my shop off and on since his first arrival and the foot has always been growing worse. The past summer the owner turned him out and he lost his shoe and developed the worst looking foot I ever saw. The sole was surely $5/8$ of an inch lower than the wall of his foot. My shoer looked it over and said it was too much for him, but I encouraged him to put a shoe on. We leveled as best he could, the wall of the foot with a rasp, we next took a narrow web shoe and punched new nail holes in from the edge and where there looked to be a place for a nail in the hoof. This narrow steel shoe we fitted around the sole and down on to the wall by searing the hoof with the hot shoe. You understand that this had to be done slowly and very carefully as the foot was very thin. This foot had grown long and narrow and as it rested on the floor the toe did not touch by more than an inch. The horse had jacked his ankle back and was traveling on his heel. To overcome this we used a very long shoe and reinforced the heels by put-

ting on a calk long enough to come well under his foot. This calk was left high at the heel and tapered toward the toe so that a straight edge would lay flat on the calk and just touch the toe of the shoe, which had no calk. The bottom of this foot was very thin and tender so we took a piece of iron $2 \times 1 1/4$ and welded it on the shoe just in front of the frog. We now cut a felt pad and a leather pad. To get the shoe on we built the wall down with narrow strips of leather nailed together. The last piece had a wide heel piece like a bar shoe to hold the leather in place. We now put on the felt and leather pad, then the shoe. The owner put the horse to work that afternoon and he has worked every day since hauling out boards from a saw mill to the sticking yard. The ground was rough and uneven, but mostly covered with saw dust. One thing was sure, when the animal came to us he was a subject for the boneyard, but by a little thinking and skill we helped him to earn his share of five or six dollars per day for about three months.

I often wonder if the shoer gets his proper recompense when he does a trick like this.



FLOOR PLAN OF MR. J. W. POKORNY'S SHOP AND STORE

Good Profits for the Blacksmith and the Auto Repair Shop Selling Parts for Fords—Not "Ford Parts"

Owners of Fords are "wising up" to the fact that they need not depend on the authorized Ford dealer for repair parts."

"FORD PARTS" can only be sold by the Ford Motor Co., or its authorized dealers.

"PARTS FOR FORDS" are made and sold by many other firms than the Ford Motor Company, and here is the opportunity for profit for the "Blacksmith and Auto-Shop Owner."

When something breaks or wears out on a humble "Flivver" the owner can either buy a new part from an authorized Ford dealer, in which case he must buy a "Ford Part", or he can buy from another dealer who handles "parts for Fords" in which case it must be called a "Part for a Ford" and not a "Ford Part."

Most people are unaware of the distinction that is made between "Ford Parts" and "Parts for Fords" or that any distinction exists, but, nevertheless there is a difference, nominally at least.

Practically every auto owner at some time or other has considered the parts business of the automobile companies as a dignified term for highway robbery and after a few instances this feeling is amply justified.

As Fords are turned out by the thousands, every one like the one before it, to the last nut and lock washer a vigorous and thriving competition has grown up between the Ford Company and other manufacturers to supply parts for the Ford cars.

The Ford Company will not sell parts of its own manufacture to any but their dealers while the competing manufacturers will sell their products to anyone.

A result of the dealer system is, that "Ford Parts" sold by the Ford Company cost more, in many instances, than similar parts sold by some other firm in no manner connected with the Ford concern.

The law effectively restrains any firm other than the Ford Motor Company from referring to its wares as "Ford Parts." The parts made by some other firm may be similar to those manufactured by the Ford Company, serve the same purpose and sell for less than the Ford product but inasmuch as the Ford Company did not make it, it cannot be called a "Ford Part", but must be called a "Part for a Ford."

There are many Ford owners who never go to a Ford agency for repairs or parts for their cars but, instead, go to the Blacksmith and Auto Shop, and it is in this manner that blacksmiths are making good profits selling and installing all kinds of "Parts for Fords."

"Parts for Fords" are provided for the trade in good range and variety and a similar part at a lower price is being supplied for practically every purpose.

The Repair of Auto Springs

W. H. MITCHELL

The repairing of broken springs for automobiles and trucks is a matter of very live interest to every shop in the country, and of particular interest to those who are located away from the cities where spare parts can be easily obtained.

A broken automobile spring is a thing that demands attention on the part of the car owner as continued neglect leads to complications that are worse than the initial trouble.

The great amount of heat treatment, tempering, bending and tapering that enter into the making of a single spring leaf and the importance of this work in securing a good spring are fully understood by the repairman and the difficulties of carrying out the different operations are quite thoroughly realized.

If a leaf requires more arch or if it needs less arch, as the case may be; (referring to leaves that are tempered) they may be re-shaped by heating to a very low red heat, and after having been re-formed by hammering

to the desired shape, permit them to cool. Do not put any water on them as a dark red heat will not draw the temper, as will be plainly seen when the method of tempering is explained.

Water tempered springs are not quite so good as oil tempered springs but the former method will be found the most convenient for the shop where repairs are made.

The special tools required for this class of work are few—a tank and what is known as a rack, to hold one leaf to serve as a pattern for the leaf that is to be formed. This rack is illustrated in Figure 1.

Make the tank of wood or iron, about six feet long, with two pieces of square iron running lengthwise for the racks to slide on so that they can be adjusted to accommodate springs of different lengths. About

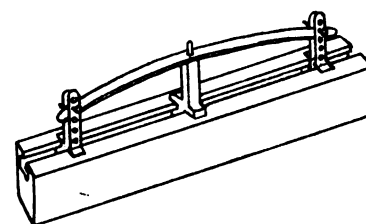


FIG. 1—A PRACTICAL DEVICE FOR FORMING SPRING LEAVES

halfway between the two square pieces attach a round piece of iron with two plates and nuts, with the top end having a pin about 5/16 inch for the hole of the spring; the ends of the leaf to be fastened to the racks. The hot leaf can be placed over the pattern leaf and pinched down with the tongs, which must pinch in the center; that is, the point of the tong should bear about midway of the leaf. If the tong pinches on the edge there will be a snug fit on one side and a space under the opposite side.

A style of tongs for this purpose is illustrated in Figure 2. Slip rings or a strap of iron attached to the end of one reign and drilled with holes for the other reign may be used to assist in gripping.

For heating the leaves a furnace is made of fire brick. There are a number of different styles of furnaces and for factory use fuel oil, fed to the furnaces by an air blast,

<p>Blacksmithing Oxy-Acetylene Welding and Machine Work</p>	<p align="center">THE O. K. SHOP J. W. Pokorny, Proprietor First Class Goods.....Unexcelled Service</p>	<p>Gas Engines Farm Machinery Tractors, Cream Separators</p>
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MR. POKORNY'S LETTER HEAD SHOWS SOME OF HIS BUSINESS BRINGING SIDE LINES

is used but this will be found out of the question for the average repairman. A less expensive and equally satisfactory furnace can be constructed for burning coke. This

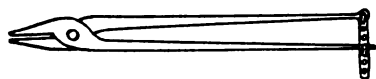


FIG. 2.—PINCHING TONGS FOR FITTING SPRING LEAVES

furnace is made long and narrow with the ends, top and one side closed, leaving the front open. Drill holes in a two inch pipe and place in the bottom of the furnace for the air blast. A power blower should be used if possible as a hand blower does not give satisfactory results.

Another arrangement which will answer all purposes for a small amount of spring repairing is easily constructed.

Build up two walls of brick about six inches apart and of any desired length, about two feet high. About halfway from the bottom lay some pieces of flat iron across between the bricks to serve as a grate. Wood is used for fuel in this furnace and the leaves are laid on the cross irons to heat.

Each leaf in a spring has a space in the center of about $\frac{1}{2}$ inch. When the leaf that is to be used as a pattern is placed on the fitting rack the ends can be sprung down a little so as to give the desired arch or space.

Have the steel at a good red heat, so it will form easily. When the leaf has been fitted to the form by pinching with the tongs every three or four inches, fasten the clamp tongs Fig. 2, six or eight inches apart so as to prevent the leaf from springing while being cooled. Do not allow the leaf to cool entirely off. Leave the steel a dark red, then remove the tongs and lay the leaf on its edge until cold, and by a little practice the average smith will have no trouble to make a spring leaf that will give good satisfaction.

For cooling the leaf, punch the bottom of a tin can full of small holes and let the water sprinkle on the spring in fine streams so as to cool it slowly and evenly, as cooling too quickly it will not be as flexible and tough as when cooled slowly and evenly.

Care should be observed in heating not to get the steel too hot as this causes it to be coarse grained and brittle. A light red heat will be found to give good results for ordinary carbon spring steel.

To temper a spring after it has been welded, re-heat that portion of

it to a good red and cool to a dark red, then stand on its edge until cool. The spring on either side of the weld heated to a dark red will retain its original temper and where the water has cooled to a dark red will give a very even temper.

In case one does not have a tank and wishes to make one at little expense that will answer very well for an emergency, it can be made from a piece of 2x4" lumber, putting legs on it and making "U" shaped irons to extend across the bottom and up each side, with a bolt through the two parts of iron about one inch above the wood so as to put a wooden wedge between the bolt and the 2x4 so to hold the racks firm when in place.

Editor's Note—We have never believed it practical to properly weld high carbon, or alloy spring steel, because the welding operation requires a fusing heat, and this means a very severe coarsening of the grain of the steel. We, of course, know that a spring leaf never breaks a second time at the welded portion, but this is simply a confirmation that this method of repairing is not practicable, because the second break occurs from the overheating, at the junction of the overheated and original structure of the material, possibly several inches from the weld.

It might be further mentioned that the blacksmith is not equipped for scientific hardening and tempering automobile springs, particularly when made of alloy steels, which require very accurate temperature control. In chrome-vanadium steel it is necessary to keep the temperature range within 25 degrees, plus or minus, and such accuracy is obtainable only with the most expensive pyrometer equipment, expert supervision and easily controlled and properly designed semi-muffle type furnaces.

Steel is used in making spring leaves should not contain less than 85/100ths of one per cent carbon nor more than 95/100ths of one per cent. It is obvious that too little carbon will result in a soft spring while more than .95 per cent carbon will make a spring that is too hard.

Emergency repairs either by welding or making new leaves can be made but in the long run a new leaf from the maker will prove more economical in time, money and satisfaction.

GIVING VALUE

However much it may cost, always give your customers the best in materials and workmanship.

Every repairman realizes the value of a good name for his work and no man who realizes this truth will offer inferior material or "scamped" work. He gives the best he has to his customers and they couple his name with the value of the work he produces. Giving dollar value for one hundred cents is the best way to build a name and reputation for your shop and yourself.

Rights In Agency Contracts

RALPH H. BUTZ

There are a large number of dealers who have contracts to represent manufacturers and jobbers as the exclusive agents in their territory, and

in many instances it has been found that the dealer is not well informed regarding his rights under these exclusive agency contracts. The right of exclusive representation for a certain article in the dealer's territory is often a very valuable right, and it is for this particular reason that the dealer should be careful as to the kind of agency contract he enters into. The form of contract offered by the manufacturer to the dealer is usually one that allows the manufacturer a great deal of latitude and leaves the dealer with an exclusive agency contract that may be terminated at any time the manufacturer cares to do so. Quite frequently it has happened that a dealer had his agency contract cancelled on very short notice, and as a result of such arbitrary action has suffered serious financial loss.

One of the most plausible reasons given by the manufacturer for the cancelling of agency contracts is because he is of the opinion that another dealer will be able to give him better representation in the territory affected. The manufacturer does not seem to realize that his present agent may have a number of sales pending on which he should receive the profit, and as there is usually nothing in the agency contract to protect the dealer in a contingency of this nature, it is easy to see who is the loser when the contract is cancelled.

An interesting case of this character, and one that illustrates the dealer's position, was recently decided in one of the higher courts. In this instance Lawson, a dealer, had the exclusive representation of a number of manufacturers and jobbers for a certain territory, and his exclusive agencies for such territory constituted valuable property rights. His territory gradually broadened as he demonstrated his selling ability to the manufacturers, until finally he found it necessary to associate himself with other business men in his territory in order that he might handle the increasing volume of business in a satisfactory manner.

Finally Lawson and all his associates and their interests were brought together into one corporation, known as The Lawson Company. For a valuable consideration Lawson transferred all his agency contracts to the corporation of which he was the president and manager.

Within a year after the organization of this corporation troubles arose and Lawson was deposed from his position as president and manager. He thereupon disposed of all his in-

terests in the corporation and again resumed his former business, operating in the same territory. He, of course, endeavored to take from the corporation the right to handle the products of the manufacturers and jobbers for whom he had previously held representation in the territory. He wrote to these various firms stating that he had severed all business relations with The Lawson Company, and that he would again engage in business individually and would be glad to again represent them in the territory as formerly.

Several of these firms immediately offered the exclusive agency to Lawson, and at the same time cancelled their agency contracts with The Lawson Company. Naturally, The Lawson Company commenced legal proceedings to restrain Lawson from encroaching on its business, and from soliciting or inducing the manufacturers to transfer their agencies to him. However, on account of the nature of the contracts held by The Lawson Company the Court could not uphold their claims, and in its opinion gave the following reasons:

"Though there is some conflict of authority, the more generally accepted doctrine is that, in the absence of an express covenant, there is nothing to prevent the assignor of a business and its good will from setting up and conducting a competing business in the same locality. There was no express agreement on the part of Lawton that he would not again engage in a competing business in the territory mentioned in the decree, nor did he agree that he would not again represent said manufacturers and jobbers. He merely transferred the agencies and good will of his business. Under the rule stated, he was thus at liberty to engage in a competing business in the same territory. Obviously any one who desired to deal with him after he had established his competing business would have the right to do so. The agency contracts given by the manufacturers to Lawson, and by him transferred to the corporation, were terminable at the will of the manufacturers. When they were so terminated the principals had the right to give them to any lawful competitor. Lawson was lawfully engaged in business as a competitor and could lawfully accept the agency contracts of said manufacturers, if tendered to him."

Thus it will be seen that the valuable property rights of exclusive agencies can not be considered by the dealer as being held very securely, unless the contracts are made in such a manner that they will give better

protection to the dealer. In the above case The Lawson Company lost their agencies as a result of having contracts that did not protect them against just such a contingency as arose. The dealer should not enter into a contract that gives the manufacturer all the privileges and the dealer none.

If the dealer has a contract that specifies a definite date when the agency may be terminated, this amounts to an agreement on the manufacturer's part not to exercise his power to revoke the agent's authority or to cancel the contract before the specified date. Should the manufacturer attempt to cancel the contract under these circumstances the dealer could hold him liable for damages arising out of breach of contract. Furthermore, if a dealer knows the exact date when his contract expires he can make arrangements to have it renewed, and if it can not be renewed he can govern himself accordingly.

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Coking Coal for the Forge

JAMES STEELMAN

The following is a simple method of making coke in small quantities without the trouble of erecting ovens for the purpose. This method of coke making is one of the first methods used and follows very closely the manner in which charcoal is made.

A tower-like furnace is built of stones or brick, in which openings are left to facilitate the flow of air. The coal that is to be coked is piled all around the "tower" and the pile is then covered with sod or clay. A fire is built inside the tower to start the pile to burning and the top covered sufficiently to retain as much of the heat as possible and at the same time to keep as much air as possible from gaining access to the fire.

The heat of the fire in the "tower" penetrates to the surrounding coal and sets free the gaseous or volatile

matter and these gases escape here and there through the sod covering.

It is necessary that as much air as possible be kept from the coal while it is burning as the greater the amount of air coming into contact with the burning coal the greater will be the amount of ash.

The length of time required for the coal to be completely converted into coke will vary with the size of the pile of coal and other conditions, from a comparatively few hours to two or three days.

The progress of the burning can be determined by inspection from time to time and as the coal becomes coked on the surface of the pile, or nearly so, it can generally be considered as having burned sufficiently to be quenched with water.

The longer the coke is permitted to burn the smaller will be the bulk of the resulting coke and a corresponding increase in the amount of useless ash.

The Oxy-Acetylene Plant—12

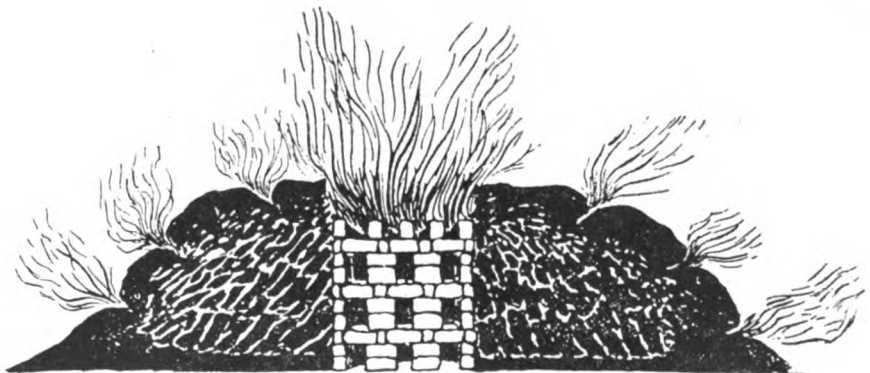
DAVID BAXTER

Examples of Cast Iron Welding.

The examples given in the following represent heavy, medium and light work. We will take each step by step so the operator will know how to do just such a job.

The first job was the heavy plunger of a steam press used for compressing blocks of salt for live-stock, and had to withstand several tons of pressure. It was in shape resembling the capital letter T. The upright piece being about four feet six inches high, and a foot square. The cross piece was flat about three feet long and three inches thick, having brackets the same thickness leading from each and down to the upright. One of the cross-ends was broken off about a foot in from the end. This made approximately ten inches of three inch metal to weld.

The piece was welded out doors.



METHOD USED FOR COKING COAL WITHOUT AN OVEN

THE AMERICAN BLACKSMITH

No attempt was made to clean or clamp the job as it was plain the preheating would remove any rust or foreign matter and the weight of the casting would hold it in place. Both the broken parts were cut away to form the groove, half of it on each piece. The groove, when finished, was almost three inches wide at the top and the entire thickness or depth of the metal. As the casting did heavy duty it was imperative to weld to the heart of the break.

The smaller part was held in place by a framework of iron rods. This also served as a grating for the preheating fire. The preheating fire was built of charcoal and was piled up over the break. The preheating was not for the purpose of regulating the expansion so much as that was well taken care of by the fact that the break was located near enough to the edge for the expansion to move outward. The preheating was kept up until the break and a surrounding space of ten inches or so reached a bright red heat.

The main purpose of the preheating was to save welding gases and allow the welding to proceed faster.

While the job was preheating, which took over an hour, preparation was made to hasten the process of welding in every way possible. The regulators were properly adjusted. The kind and size of filler was chosen and handily placed. The filler chosen was three-eighths round cast iron. The flux was also placed in readiness near the job. The torch, hose and other equipment was examined to see if there was any danger of interruption. The proper tip was selected and fitted to the torch and another placed near in case the one in use became clogged. The gas tanks were examined to be certain of enough gas to do the job. All this preparing saved a great deal of time later on.

It required nearly two hours to get the casting hot enough to weld. Some trouble was experienced in getting the charcoal to burn right, but this was accomplished by using wood kindling and kerosene oil.

A neutral flame was used throughout the process. On account of the large amount of heat, the torch gave some trouble by back-firing, but a bucket of water was kept near so little time was lost in cooling the torch. Two torches could have been used to an advantage but only one was available.

Sheets of asbestos paper were arranged over the fire in such a manner as to protect the operator and yet permit working space.

It was not so particular to keep the flame in motion as there was little danger of burning such a large amount of molten metal. Of course, the flame had to be sprayed around over the sides of the V, as fast as the new metal was added; but this was to keep the weld melted so the new metal would fuse with it.

The filler rod was kept continually in the melted weld, being fed in as fast as the melted weld would take it. The new metal was melted in layers back and forth across the casting. The welder-rod was used to stir and mix the melting metal as the work proceeded.

Layer upon layer was welded in until the top was reached.

A dash of patent flux was thrown upon the weld from time to time, by a helper who hovered near.

The operator decided before hand that it would be difficult to grind or file the finished job, on account of its weight, which was about thirteen hundred pounds and on account of its angular shape. Therefore, he employed the hot-finish method as he finished the work. Before the weld commenced to cool he went over it again with the flame, blowing the high spots toward the low and scraping away the rough spots. In this way considerable time was saved and gave the weld a rather neat appearance too.

As there was no need for tempering, annealing or restoring, the welded casting was not reheated.

While there was little fear of strains or cracks it was thought best to cover up the job and allow it to cool slowly. This was done by placing several coverings of asbestos paper over the casting and fire. In this shape it was allowed to stand for several hours.

When quite cool, a little dressing with a chisel and a coat of paint made a nice looking job. The casting had been in service six months, when this was written and showed no signs of breaking.

Another Example.

Our next job will be one quite likely to come into any repair shop: A broken auto engine cylinder. This cylinder was cracked around the shoulder and down the side of the water jacket. The crack was in all about nine inches long. The cylinder also had two of the lugs or brackets, for bolting to the crank case, broken off and missing entirely.

The lugs were welded first because there was not so much expansion to contend with; although the whole casting was preheated.

Before any welding could be done,

the place where the lugs had been was filed smooth, then two lugs were cut out of wood and shaped to fit. These wooden lugs were then taken to a foundry and cast of iron. The lugs and the break were grooved or made "V" shape from the bottom. The crack on the shoulder of the casting was also grooved. This was done partly with a hack saw and partly with a sharp chisel.

When everything was in readiness to weld, the lugs were tacked or spot welded to hold them in place, the cylinder was placed upside down in the preheating fire, while the lugs were firmly welded in place.

The preheating fire in this case was natural gas aided by charcoal.

After the lugs were welded on, the cylinder was quickly turned right side up in the fire. The fire was enclosed with asbestos and the cracked end, which had reached a red heat, was attacked. The cylinder was kept on end as near as possible, throughout the welding, to allow the heat of the fire to pass through the bore of the cylinder. To prevent the fire from harming the bore, it was coated with a mixture of oil and graphite. This mixture retained the polish of the bore.

A neutral flame was employed with a rotary motion. On account of the thinness of the metal, the flame was never allowed to remain in one spot more than a few seconds. If the flame was held in one spot it would soon melt a hole through the water jacket and cause it to have to be welded too. The torch was slanted to throw the flame in the direction of the welding.

A small filler rod was chosen, because a large one would melt too slowly, again endangering the jacket melting through by having to hold the flame in one spot too long.

A little flux was used by dipping the filler in it at intervals. Its purpose was to clean the metal of slag.

No attempt was made to hot-finish except the natural working of the metal ahead of the torch.

As soon as the crack was welded the cylinder was placed upright in the fire which was replenished and enlivened. Then the whole thing was covered with asbestos and left to cool. Care was taken that no cold air was sucked in through the casting. Even after the casting was fairly cool, it was transferred to a box filled with asbestos scrap and covered up for several hours.

When it was cold it was taken from the box and examined to be sure there were no strains or cracks. The welded places were ground smooth on an emery wheel and a coat of paint was

added. The water-jacket was then attached to the city water and tested for leaks. Should it develop serious leaks the whole preheating would have to be done over again while the leak was welded shut.

A Light Job.

Next we will take a small casting, one that is familiar to every one—a stove leg. It is one that requires little preparing and no preheating. But on account of its irregular shape, it is not so simple as it seems. The irregularity is taken care of by bedding or pressing the leg into a quantity of moist earth. Molding sand is preferable, but ordinary earth will do, only be sure it is neither too wet nor too dry. Have it as moist as fresh plowed ground; have it moist enough to squeeze into a ball, which will crumble between the fingers.

The stove leg mentioned was ground back from both edges of the broken parts to form a groove when the parts were put together. The grinding was on the inside of the leg so as not to spoil the ornamentation on the outside. The welding was on the inside for the same reason.

Great care was needed to keep the flame from melting through and spoiling the outside. Of course, it would not have harmed the weld to work clear through, but the operator wished to do an extra nice job, also to evade any grinding in order to do the work as cheaply as possible.

The leg was bedded in the moist earth, face or fancy side down. The welding was started at the center and worked both ways, a little at a time. The reason for starting at the center was to keep the leg from twisting. This warping might have been overcome by starting at one end and spreading the other one-eighth of an inch.

A one-eighth filler was used, also a little flux to float the slag.

A neutral flame from a small tip is proper for small jobs like this.

The welding should be done as speedily as possible, keeping the filler in the melted weld as much as possible. If we are careful not to melt through, there is no finishing necessary, except perhaps a little stove polish after the leg is cold.

Examples of Malleable-Cast.

Malleable-cast is in reality a form of gray-iron but it acts more like steel under the oxy-acetylene flame. It has the same tendency to fly away in the form of sparks, only in a lesser degree as steel. By this sparking we know the amount of oxidation. If the sparks fly in a shower the oxidiz-

ing is too great, we are forcing the welding too much.

As an example of malleable welding, we will take a sprocket wheel broken through the rim and one spoke. The wheel was twenty inches in diameter and had an average metal thickness of three-fourths of an inch.

The breaks were grooved with a thin, flat emery wheel. No clamping or cleaning was necessary. The wheel was preheated all-over to a red heat, with natural gas burners. It was necessary to commence welding before the expansion reached its limit. As the wheel expanded the breaks commenced to spread open. Had the operator waited until the cracks had opened to their limit and then filled the cracks with new metal a distorted or crooked wheel would have been the result. Too much metal would have been added which would not allow the contraction to re-act in its normal way. If the wheel was gray-iron, it would break again in one or more places, but as malleable is considerably tougher, the most probable result is a wheel that is not round.

As the wheel was expanding all the time, and more so as soon as the welding started, the operator was forced to work rapidly. A Norway iron wire, wrapped with a copper electric wire was the filler. Borax was the flux used. A slightly reducing flame was used. The reducing flame reduces the temperature by reducing the oxygen or increasing the acetylene pressure.

No attempt was made to hot-finish or influence the metal with the flame, as the main object was to finish the job as soon as possible. The casting was covered completely as soon as the welding was done. No attempt was made to reheat. This would do no good.

When the wheel had been covered up the preheating fires were shut off and the wheel was permitted to cool at will. No cold-finishing was needed except around the sprocket tooth that was welded.

The welding was confined to a strip approximately a half-inch wide. The new metal was fed in as rapidly as possible and no time was wasted trying to mix and clean it. The operator melted on as large an amount of new metal as he could get the weld to assimilate and then simply puddled it along the cracks. To use familiar words: He forced the new metal to soak into the weld.

(Conclusion.)

Benton's Recipes

To Caseharden Cast Iron.—To caseharden cast iron use a pot of suitable size for the piece, packing it in with 2/3 raw bone and 1/3 charcoal ground to about the same size as the bone. Seal the pot cover with fire-clay and place in a furnace and run it about 5 hours. Then take out the work and dip in oil or water.

Good Casehardening Mixtures.—One part sal-ammoniac and 8 parts prussiate of potash; or, 1 part prussiate of potash, 2 parts bone dust and 2 parts sal-ammoniac.

To Harden Fine Dies.—To successfully harden dies for fine work, such as are used by jewelers and others, be careful to have the surface free from all grease or oil, pack face downward in a mixture of equal parts of finely powdered hardwood charcoal and charred bone. Dip in salt water and draw temper to 450 degrees F.

Bluing Iron or Steel.—Mix one part clean sand with one part powdered charcoal, heat the whole evenly in a pan or convenient receptacle until the piece, which has first received its finishing polish and been covered by the mixture, comes to the desired color. When cool, wipe dry with cloth.

Alloy for Pattern Letters and Figures.—A good alloy for casting pattern letters and figures and similar small parts in brass, iron or plaster molds is made of lead, 80 parts, and antimony, 20 parts. A better alloy will be lead, 70 parts; antimony and bismuth, each 15 parts. To insure perfect work the molds should be quite hot by placing them over a Bunsen burner. The writer has had thousands of pattern letters and figures made in this manner.

Cement for Cast Iron.—Mix 1 pound cast-iron filings, 1 ounce sulphur, and 2 ounces sal-ammoniac. Mix thoroughly and keep dry. When using, mix one part of this composition with twenty parts clear filings and some very fine sand. Make into a stiff paste with water.

Don't Screw Them Down Too Tight.

Users of gas engines are often urgently advised by writers in the technical press to be sure and see that all nuts are kept tight and snug. It is well to remember that this can be overdone, and a nut may be turned down so tight as to make it impossible to remove it should that necessity arise. In placing a nut upon any part of an engine with a long-handled wrench, it must always be remembered that some day the same nut will, in all probability, have to be removed.

It is a well-known fact that on long leverage, immense turning force can be applied to a nut, but it is not necessary to exert the fullest strength of which a man is capable in putting a nut in place or a spark plug in the cylinder. A certain amount of common sense must be injected into the operation, and while it is always well to have the nuts on an engine tight, it is also well to remember that there is a liability of having to remove them under unfavorable conditions.

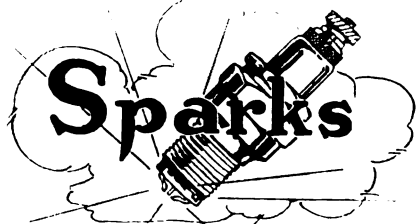
To Brass Small Articles.—To brass small articles of iron or steel drop them into a quart of water and 1/2 ounce each of sulphate of copper and protochloride of tin. Stir the articles in this solution until desired color is obtained.

His Lesson

The rich man trudged along the road,
His car had broken down;
And through the Summer heat he strode
To reach the nearest town.
A fat, old farmer came along
And, with a cheery grin,
Said he: "This rig is plenty strong—
Git in, stranger, git in!"

He drove the rich man to the town
As one might help a child;
And when the rich man sought to pay
He shook his head and smiled
"You mean it right, thar ain't no doubt,
And I ain't rich," said he,
"But helpin' of a feller out
Is pay enough for me."

Back to his home the rich man went,
As one who knows his faults,
And never put another cent
In safe deposit vaults.
He learned to help his fellow men,
And help them with a grin;
And how he chuckles, now and then,
"Git in, stranger, git in!"
—From New York "Evening Journal."



With the present high cost of living it is even necessary to pay a stiff price for a soft hat.

Isn't too early to begin making preparations for next spring's war garden.

Despite unsettled conditions spring and summer appear to have unbounded possibilities for the repair man. Many materials are hard to get at any price and owners of automobiles and farming implements will be compelled to take better care of them and look to their repair.

Even the fellow who says life isn't worth living doesn't freeze to death.

How are your New Year's resolutions holding out now?

We want you to write us about that hard job you did the other day. The other fellow will enjoy reading about it.

After a man has plenty of money he doesn't care how shabby his pocketbook looks.

Remember that the food you may waste today may mean hunger to someone tomorrow—Be saving.

It's all right to take the word for the deed, but not in a real estate transaction.

What is it you are having trouble with in your work or your business? We're here to help you out on anything and are glad to do it.

Might doesn't make right but it helps a lot to sustain it.

Don't try to run your business without an accurate set of books.

There is no such thing as the biggest half, in spite of the fact that most people want it.

Don't guarantee repair jobs and you'll save yourself a lot of trouble and worry. When a job leaves your shop with the work guaranteed, the owner is pretty sure to find some way to bring it back when in trouble again. A good job needs no guarantee.

The best way to make a success of your business is to keep faith in yourself and your customers and—charge cash.

Enjoy life as much as you can, but don't make that your business. The man with no other business than having a good time does not succeed even in doing that.

Everyone is about agreed that a dependable tractor is more economical, for practically all the heavy work on the farm, than horses.

There's another Liberty Loan coming—prepare to help your Uncle out.

Buck up—All good go ahead men feel they are failures sometimes.

The fuel situation brings back memories of the old argument about how much wood would a woodchuck chuck if a woodchuck could chuck wood.

Virtuous labor is ennobling, but at the same time you will always find vice in a machine shop.

A good fellow is one who spends his last dollar like a king with one friend and then slips around to another friend to borrow carfare home.

You never can tell, many a man who has a face as red as a beet isn't one.

Something else to worry about—Owls are considered unlucky in some countries.

The more waste the less food.

It sometimes happens that the flower of the family blossoms into a wall flower.

Billy Sunday is the only man who can make a prayer sound like cussin' but we never heard anyone cussin' that sounded like a prayer.

Common sense is never a liability.

Neither a borrower or a lender be.

If advice had a market value there would be a lot more millionaires than there are.

When you win out against your rivals one day, try even harder the next day. You may be sure they are trying hard to retrieve their losses.

Clothes don't make the man but an "O. D." uniform will put a lot of stiffening in his backbone.

"Live and let live" is the slogan one shop owner has adopted in his advertising. Someone said when the Declaration of Independence was being signed "If we don't hang together we'll hang separately."

When a plumber makes a mistake, he charges twice for it.

When the lawyer makes a mistake, it's just what he wanted, because he has a chance to try the case over again.

When a doctor makes a mistake he buries it

When a judge makes a mistake, it becomes the law of the land.

When a preacher makes a mistake, nobody knows the difference.

When the electrician makes a mistake, he blames it on induction; nobody knows what that is.

When the repair man makes a mistake—GOOD NIGHT!

This is hard news for Editors—A large Insurance Company recently made an investigation to find the average age at death according to occupation.

From the data compiled, farmers and farm laborers are the longest lived workers, the average at death being 58.5 years. Next in longevity comes blacksmiths who live an average age of 55.4 years. The shortest lived class of workers are, according to the figures given, book-keepers and office assistants who die at an average age of 36.5 years.

The present fuel shortage is making things dangerous for the blockheads.

The automobile and the tractor, like the sulphur match, is here to stay, because progress demanded something better than the ox-cart and the tinder box.

"Safety First" is a good motto to live up to but an even better one would be "TAKE NO CHANCES."

Speak well of your neighbor if you want him to keep on being neighborly.

Have a look at the worries of the past occasionally. How they have dwindled!

Don't resort to cut throat competition to "build up" your trade—it can't be done.

One way to get rid of your hard lot is to advertise it for sale.

The feller that calls you brother generally wants something that don't belong to him.

Things to worry about—Peru has the highest railway station in the world.

It is much easier to collect a bill when it is fresh than when it gets to be several months old. Don't let your customers get behind with their accounts.

Your practical hints on automobile and other work are worth money to you—send them in and send some pictures along with them.

Don't overcharge your patrons when they bring a car to you for repairs. They may not say anything about it at the time but you will be apt to wonder why they don't come back again.

The tractor business is just beginning to come into its own and this field presents a splendid opportunity to the country repair shop. Don't pass it up.

The magneto is a cute little piece of machinery that has something to do with electricity if you only let it alone.

Be progressive—advertise.

The trouble with highbrows is that they carry too much "overhead."

What are you doing to increase your business and your income? We want articles and photographs. An interchange of ideas is good for everyone.

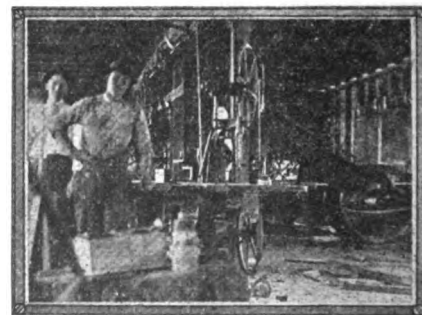
An ounce of fire prevention is worth a pound of extinguishment.

Talking sense to some people is like shouting in the Mammoth Cave—all it wakes is echoes.

Opportunity is like a wild horse that can only be mounted on a jump. Get your foot in the stirrup and then you're master of the situation.

Don't run a one time advertisement in your newspaper and then stand in the doorway waiting for the work to come in. It takes persistent advertising to bring results.

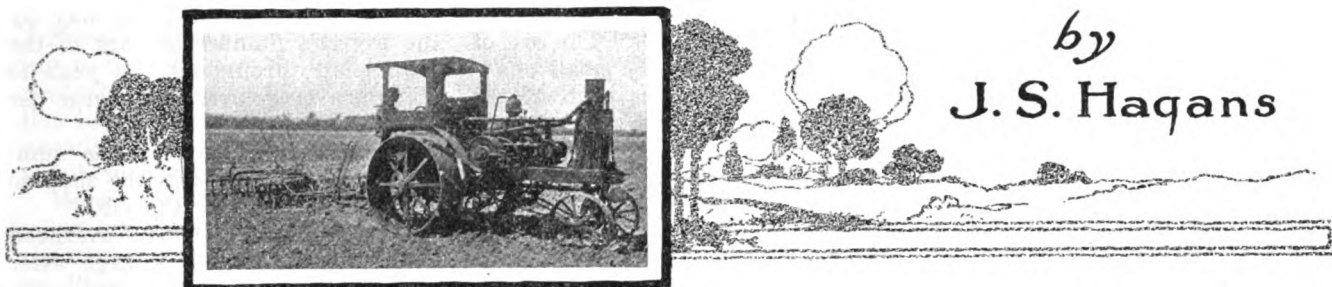
After all the only difference between a tramp and a globe trotter is mostly money.



THE INTERIOR OF G. O. TANKERLEY'S TENNESSEE SHOP SHOWS UP TO DATE EQUIPMENT

The Tractor "Arrives"

by
J. S. Hagans



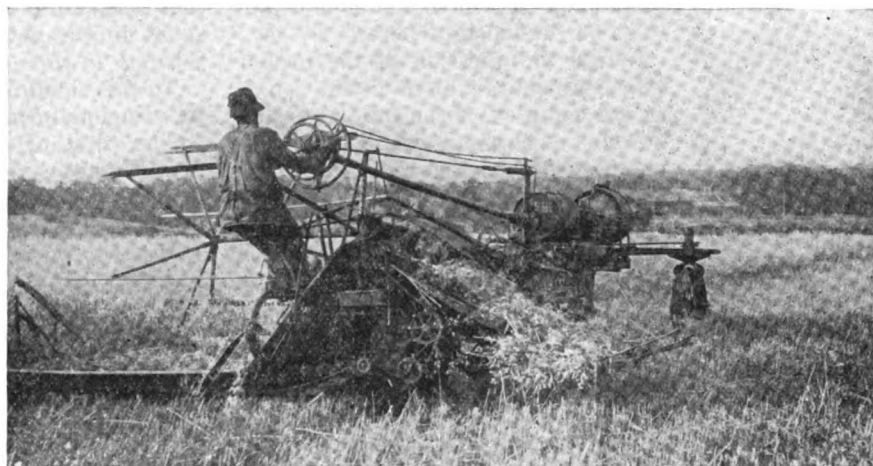
After its wanderings in the wilderness of indifference, the farm tractor is about to enter the promised land of universal service and general popularity.

A few years ago a farm tractor, in use on the farm, was a sight worth going miles to see, and a feature of the county fairs of a year or so back, was a tractor demonstration. Much interest was shown and that was all. What tractors were in use at the time were generally steam propelled and there were some gasoline tractors in use and giving good service, but like every other innovation in farming methods the tractor was looked upon with suspicion and so long as things went along in the

to do, but thousands of their sons are now in military service and farm labor is practically impossible to secure at any price. The plowing, seeding and reaping must be done—and here is where the tractor comes

There is a tractor for every farm, from the little one of a few acres to the largest ranch and the number of things a tractor can do besides plowing would make a professional magician ashamed of himself.

Skilled and trained men are going to be required to care for these thousands of tractors that will shortly be in use and the local repairman is the man who will be called on to do the work. To the man who has had some automobile or gas engine experience the work will be simple because there is but little difference between the two aside from looks. To



THE TRACTOR MUST HELP FEED THE WORLD

into its own. It can do the work and do it quick. Where a farmer and a team of horses considered an acre or two a day a big day's work the tractor comes along and does the work in half the time and with less effort on the part of the farmer. In the course of the next few years practically every farm in the land will be equipped with a tractor of some sort and the repair shop owner with foresight will be making no mistake in posting himself thoroughly on tractors.

The demand for all sorts and models of tractors is increasing every day and manufacturers are finding it difficult to make production keep pace with their orders, but they are being turned out—big and little, operated by gasoline, kerosene and steam. Some of them are patterned after the familiar steam traction engine, in use for years, and others are built along the lines of the famous "tanks" and have the characteristic "caterpillar" tread.

those who are not already doing automobile work this is a line worth looking up.

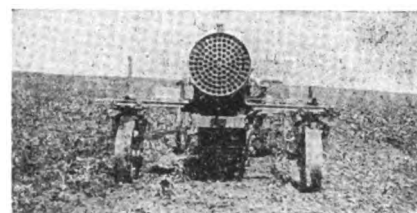
To give the information that will be required and demanded of us on tractors, articles will appear from time to time and a regular department will be established to discuss



DOBBIN NEVER PULLED A PLOW LIKE THIS

good old way—why bother with a tractor?

Over night, so to speak, our country is at war and we find ourselves entrusted with the responsibility of feeding ourselves as well as a great part of Europe. The cultivation of more land is a vital necessity in meeting this responsibility, and this the farmers are more than willing



THE FARMER'S IRON HORSE

and handle all tractor problems and other matters in connection with their care, repair and operation.

Not only is the tractor going to prove a mighty factor in keeping the world from starving to death but it is going to keep the boys on the farm.

The Motor Car Paint Shop —VI*

A Series of Helpful Articles on Painting and Re-painting the Automobile. Bookkeeping and Cost-keeping.

Some vehicle paint-shops are run on the principle of the old apple-woman who bought apples for twenty-five cents a dozen and sold them for two cents apiece and explained that she made money because of the volume of her business.

Some garage paint-shops are run with the idea that they will help the repair business and for this reason may properly be run at a loss.

Some towns have too many paint-shops.

In some towns the paint-shops are so anxious for work that they cut prices against each other, lower and lower each season, while the cost of painting cars is constantly advancing.

Some paint-shops estimate on painting jobs by rule of thumb, taking no account of overhead expenses of any kind.

These are a few of the reasons why some paint-shops do not make money.

This article is not intended for the shop that wants to run its business on any one of these plans.

If you want to make money out of the painting business, it is necessary that you run the shop as a business proposition on a business basis.

The three essential rules are:

1—Satisfy your customers.

2—Get business in sufficient volume.

3—Charge enough for your work to make the proper percentage of profit on every job.

In order to satisfy your customers you must have first-class painters and use the best materials.

In order to get business you must advertise.

In order to be sure you are making a profit on your work you must have a careful system of estimating, and you must include in your estimates a sufficient charge for overhead expenses.

This chapter takes up the question of how to make a profit on every job.

The elements of cost on every job are (1) labor, (2) materials, (3) overhead, and not the least of these is overhead, though it is often left out of the calculation entirely. After all the elements of cost have been figured in, there should be a set percentage of profit to be added on every job.

The items of labor and material are more or less obvious charges and nothing need be said about them ex-

cept to ask you to note that it is always wise to use the best materials even though they cost somewhat more, for the reason that they are usually easier to apply and hence tend to cut to the minimum the more expensive item of labor. The cost of material is a relatively small one—not more than 10 per cent. of the whole and usually not more than 5 per cent. It is obvious that, if by adding a dollar to the material cost the labor cost can be cut \$3.00, there is economy in doing so. It is not so obvious, perhaps, but quite as certain that, if poor materials are used, there will be jobs that come out wrong and have to be done over, at perhaps *double* the cost for both materials and labor.

The question of overhead is generally not handled correctly and as a consequence the trouble with the paint-shop that loses money is usually to be found right here.

While the question of the proper overhead charge on a given job is rather complex, if the following suggestions as to method and detail are made use of a correct estimate will be arrived at:

The rent of the paint-shop must be figured; or if the building is owned by the proprietor a proper rental charge must be figured.

Superintendence must be allowed for. If the foreman of the paint-shop also helps in the actual painting work, part of his time (while he is *not* painting) should be charged for as overhead.

All clerical help—stenographers, bookkeepers, office-boys, etc.—and all general office and shop expenses—telephone, light, heat, etc.—must be included in overhead.

A proper charge for bad debts must be included.

The following method of arriving at the proper overcharge head for *all jobs* is a fairly good one. It is simple and sufficiently accurate for any except the largest shops:

Add together the average yearly total of the following:

a—Rent.

b—Proprietor's and foreman's time not actually employed in painting—i. e., superintendence.

c—Clerical help and time of workmen not employed in productive work.

d—Heating, lighting, telephone, stationery, postage, advertising, etc.

e—Depreciation and up-keep, including average amount expended for furniture, brushes, machinery, etc.

f—Insurance of all kinds, taxes. (If you own your building do not

make a double charge for taxes, interest, etc., and also for rent).

g—Bad debts.

Divide the total amount by 300 to give the average overhead per day.

Divide the overhead per day by the average number of cars in the paint-shop throughout the year to give the average overhead charge per car per day.

Multiply this figure by the number of days a car is in the shop to give the overhead for the job.

Do not include in this overhead charge your storage charge after your painting job is completed.

In estimating a proper price for a job, the man who makes the estimate should figure out the number of days it will require and begin with the overhead charge. He should add to this the cost of labor on the job, including a proper charge for any of the foreman's time which may be spent in the actual painting of the job.

To this should be added the cost of painting materials.

The total of all these items will give the approximate cost of the job and to this should be added a proper percentage of profit. It is usually not safe to estimate less than 50 per cent. profit.

As to what should be charged for motor-car painting jobs of different kinds, this will necessarily vary with conditions, such as rent and the labor wage-scale in the different localities. The percentage of profit will have to be governed to a certain extent also by local conditions such as the prevailing price for car-painting, the amount of work to be done, etc. But don't allow yourself to be governed too much by local conditions—make your own conditions. If work is scarce, advertise and get more; if other painters are doing work too cheaply, advertise the quality and durability of your work and make good on your promises, and you will be able to charge a higher price *and get it*.

The great end in view is to charge enough to insure a legitimate profit. At the present time the average paint-shop is *not doing this*. There are all kinds of leaks which do not get into its estimates.

The motor-car business in all its angles should be run on a business basis. The painting end, because of poor business methods, is the only end that has not shared properly in the prosperity of the new industry up to now.

It is up to you to change this condition as far as you are concerned.

(To be Continued.)

Selling Automobile Supplies

Some timely suggestions having to do with one of the most profitable branches of business that has been created by the unparalleled growth of the automobile industry.

More profit and a bigger demand for automobile accessories than in any other field for the small dealer.

The initial investment small, the returns quick and profitable.

There is no parallel in our industrial history comparable with the automobile business, which within ten years, has come to be looked upon as one of the leading industries of the country, both in the number of men employed and the amount of capital invested and the man with the repair shop or the man who operates a garage should ask himself whether or not he can get some share, even though it be a small one, of the enormous demand that has been created for accessories of all sorts.

This subject is one worthy of extreme consideration to those who are located on main highways where they are in a position to meet the demands of the passing tourists as well as from the owners of cars in the surrounding territory.

Get interested in this subject of the accessory business but don't jump into it recklessly. When you have decided to investigate the possibilities that this branch of the automobile business presents just make a quiet little canvass of the number of people in your own locality and in the surrounding territory who own cars. If you handled the articles that they are in constant need of, figure to yourself whether or not the volume of their business would be sufficient to justify your stocking up. It is quite possible and entirely probable that your investigations along these lines will be a revelation to you in the amount of business you find available.

As a further step, take a census of the number of cars that pass your place of business for a few days, or for a week or so. The information you get in this way will be well worth the time spent.

If your investigations lead you to believe that you have enough prospective trade in view, the beginning

of your accessories business can be made in a small way and at small expense.

From what you already know about automobiles you know there is a constant demand, and particularly on the road, of such things as tires, both tubes and casings, lubricating oils, gasoline, greases, spark plugs, tire chains, tire repair materials and any number of other things that will suggest themselves to you as being absolutely necessary to the motorist.

Tire pumps, wrenches and articles of that sort are not worth bothering with, for as a general thing, these articles form a part of the car's regular equipment when it is sent from the factory and if they are not on the car when needed it is only through the owner's carelessness.

You know above all things that shortage of gasoline and oil, and tire accidents are the daily experience of some motorist and these accidents are just as likely to happen in the neighborhood of your shop as any other place and if you can fill the motorist's needs you are the fellow who gets the profit.

In the community that has no well equipped garage there is a better opportunity but where there is such a garage there is an element of competition to be considered which is well worth some thought and the greater the competition in your neighborhood the more consideration should be given to it. However, in most places the small garage is more of a name than anything else and the stock of accessories carried is usually very limited. It would be well to make a quiet little investigation to ascertain the amount of their stocks and the amount of business done by them in these lines. You may be able to get some information that will be of great value to you one way or the other.

Automobile owners, as a class, are people of some means and are usually ready and willing to pay well for their requirements and in addition they bring with them a cash trade that while transient none the less, leaves the dealer with his profit in his pockets.

The most necessary thing to the operation of an automobile is gasoline and a gasoline filling station at your place of business will generally bring with it the sale of some other

article. Motorists are constantly on the lookout for the gasoline pump at the edge of the sidewalk and this serves as a perpetual advertisement to the dealer, incidentally this is the easiest and simplest way of getting gasoline into the car. A good idea in this connection is to have sign boards placed along the roads for a mile or so from your place stating that you have gasoline for sale. This same method can be worked out in announcing to the tourist that they can secure new tires or tubes or repairs for the old ones at your place. This is one of the oldest forms of advertising known but just the same it loses none of its effectiveness, for the motorist in trouble, is always on the lookout for just some such friendly signboard.

All things being considered there is a considerably higher margin of profit to be secured from the sale of automobile supplies than from practically any other line, and as has been mentioned, it is the man who is in a position to supply the motorists' wants who gets the profits.

Naturally, you will give this matter of auto supplies some thought, if you have not already done so, and it might not be a bad idea to consider taking the agency for some well known make of automobile pleasure car, truck or tractor. This, of course, will require some capital to begin with but when it is considered that the average profit on the sale of an automobile or truck is from 20 per cent. to 25 per cent. of the list price the car agency is one worth considering to the wide-awake man.

Vulcanizing—If you're not vulcanizing tires you're losing money—big money.

Every car has at least eight tires per year and they need repairs very often. Tire repairing is the biggest source of revenue to the wise repairman who is equipped to handle the work and you can build up a good business for yourself.

When car owners come to you for supplies—gasoline or oil—they will gladly bring their tire repair work to you for it is cheaper to have their tubes and casings vulcanized than it is to throw them away and buy new ones. You can have a sort of follow-up system and keep tab on their tires and remind them when vulcanizing or perhaps—new tires are needed.

Vulcanizing is simple, the machines that are required to do the work are not expensive and a few jobs will more than pay for them.

There is nothing about vulcanizing that anyone can not understand—anyone who can clean and adjust a car can conduct a highly profitable vulcanizing business.

Tapping Holes In Cast Iron.—Kerosene oil used as a lubricant for tapping holes in cast iron is the best lubricant known to the writer.

Will the Automobile Dealer Be the Tractor Dealer?

An automobile dealer located somewhere in an Iowa farming community sees his neighbor, the implement dealer, doing a rushing business in tractors.

It is only natural that this automobile dealer should wonder why it wouldn't be possible for him to get some of this tractor business. He figures that the tractor is closely related to the automobile and that his knowledge of the automobile business should be more than sufficient to enable him to successfully tackle the tractor proposition.

Such an automobile dealer is not so much of a makebelieve after all, because there are probably hundreds, perhaps thousands, of small town automobile dealers that are thinking along the same lines.

But there is a whole lot more to establishing a successful tractor business than appears on the surface.

This question of who is the best tractor dealer is one that has been discussed at great length, and even now, is a very debatable point among men who have the greatest knowledge of conditions governing tractor distribution and sales.

Some of these authorities believe that the implement dealer is the logical tractor dealer. Others believe that the methods of merchandising that have been heretofore common among implement dealers will not do at all in the sale of tractors, and that the automobile dealer is best suited to handle tractor sales, because the method of merchandising necessary is far more closely allied to the automobile industry than to the implement industry.

Still other authorities believe that neither the implement dealer nor the automobile dealer will be eventually the recognized tractor dealer, but that a new business will be built up, and a new type of dealer established, who will be neither an implement dealer nor an automobile dealer; but strictly and solely a tractor dealer. Perhaps this new dealer will be recruited from the automobile or the farm implement field, or perhaps he will derive his training from a field of work entirely different from either of these two industries.

At the present time, the implement dealer seems to have the best of the argument for several reasons. For instance, a farmer does not buy a tractor alone. He must have plows, harrows and other implements to go with his tractor. Naturally, the

farmer would go to the implement dealer for these machines and would prefer to buy them from the man who furnishes tractors so that in case the service of either the tractor or implement is not satisfactory he can go to one man for satisfaction. In this way he runs no risk of having the tractor dealer blame the trouble on the implement dealer and *vice versa*, and thus get no satisfaction in the end.

So it would seem that if the automobile dealer decided to enter the tractor field, he would eventually become an implement dealer also, which brings up the question, why shouldn't the tractor dealer be in the implement business already? And why should it be necessary, or desirable, that the tractor dealer should be entirely inexperienced in sale and service of farm implements?

There are more things to think about than merely selling the tractor. In the first place the tractor dealer should be conversant enough with farm conditions and possess a sufficiently high degree of agricultural knowledge to be able to recommend to a farmer the kind of tractor he really needs. The dealer should consider the local conditions of the prospect, his acreage and percentage of grades, if any, to be encountered. If, for instance, a farmer intends buying a 10-20 outfit, but in reality has need of a 15-35, the dealer should tell him so, and possess the farmer's confidence to such a degree as to convince him that he really needs a larger machine.

After the tractor is sold, there is service to be rendered to the tractor owner, just as service must be rendered to the automobile purchaser. The average farmer works a tractor so that under the mechanical conditions existing in tractor construction that tractor motor actually travels in a year a distance equivalent to driving an automobile 25,000 miles. The automobile dealer is familiar with the amount of repairing necessary for maintaining an automobile in good running order for a distance of twenty-five thousand miles, and can judge from that the service that a tractor owner must have.

And the automobile dealer knows that a motor car requires more attention during the first five hundred miles than during the next four or five thousand miles. The same is true in even greater degree with the tractor. The farmer must be taught how to run his tractor, and this instruction must be careful and thorough. Most farmers, upon buying a tractor,

attempt to drive it faster than is best for the machine, and at a higher rate of speed than can be maintained and keep the tractor in a continuous state of efficiency. When a man buys an automobile, he usually does not drive it more than forty or fifty miles a day, for the first week or ten days. But the farmer, who buys a tractor, puts it to work immediately and expects all manner of things from it. The tractor, on its first day on the farm, will probably be obliged to work for ten straight hours, or the equivalent of driving an automobile two hundred and fifty miles. Therefore, the tractor dealer must render a service that will prevent the farmer from abusing and seriously damaging the tractor before it has time to "wear in."

Taking it all in all, the man who will win out as a tractor dealer is the man who possesses a knowledge sufficient to control the situation, no matter what business he may now be engaged in.

As far as the automobile dealer is concerned perhaps it would be better for him to stick to his knitting because the sale of automobiles to farmers is bound to increase and be enough of a business in itself to require all his attention and his specialization in this one industry.—*Timken Magazine*.

Running the Car on Moth Balls

Some years ago experiments were made in Europe and, to a lesser extent in this country, looking toward the use of naphthaline as a fuel for automobiles and internal combustion engines generally, to take the place of gasoline, which at that early date was beginning to show evidence of price manipulation and inflation. The experiments didn't pan out according to expectations and were accordingly forgotten about.

Every once in so often someone takes up the malodorous moth ball again and tries to run the old "bus" on a moth ball diet and with more or less success.

The first experiments in the use of this substance were made some ten years ago in France and the recent skyward tendency of gasoline has revived interest in this substance as a substitute for John D's. product.

In the original experiments naphthaline was vaporized by heat from the exhaust gases passing through a heating jacket next to the mixing chamber of the carburetor used. The camphor, (another name for the same thing) melted on contact with a coil,

heated by the gases of the exhaust and flowed to the spray nozzle of the carbureter. After the liquid sprayed from the carbureter it came into contact with the heated walls of the mixing chamber and assumed a gaseous form.

The individual experimenter usually uses one and a half or two moth balls to each gallon of gasoline and their use may or may not record greater efficiency in engine operation, depending altogether on conditions and the confidence of the experimenter.

The use of moth balls in this connection has no injurious effects on any part of the gasoline system or the engine but undissolved crystals of naphthalene are likely to clog up the carbureter and cause trouble in that manner.

Moth balls, however, like all the other "dopes" that are claimed to give better engine results and more economical gasoline consumption are hardly worth the time occupied in messing around with them, and in most cases certainly not worth the price.

Buying a "Used" Car

To those who are considering selling a "used" car, in other and plainer words a second hand car, or buying one, the several suggestions here offered should prove of value.

In the winter and spring months the used car business thrives and flourishes more than at any other time of the year.

Before you try to unload your old car find the new car that you feel will meet your requirements and gives you the best value for the list price. Different dealers have offered from \$300 to \$1,000 on the same used car on an exchange deal and the extreme variation in the offers for the old car probably means that the dealer who offers \$1,000 is in all probability exchanging it for a new car listed for more than its actual value. and from the standpoint of value received the \$300 offer might have been the better value.

Find a reliable dealer—there are a few of them—who sells the car you feel that is best adapted to your needs and then look about for the most satisfactory offer for the "old boat."

In purchasing a used car by no means go by the appearance alone, and again the matter of dealing with a reliable dealer must be emphasized. In doing this you do not run so much risk of finding yourself the possessor

of a stolen car and liable as such under the law.

Go into the history of the used car you figure on buying very carefully. Find out how long the dealer has had it on hand, how many miles it has been run, who the previous owner was, whether the dealer bought it new or second hand and find out the age of the car. If you can, get the car number and ascertain from the maker just when the particular car left the factory, if there is any doubt as to the age of the car you consider buying.

After you have obtained this information take up the mechanical details of the car. Examine all the parts that you can, pay special attention to the cooling system, the brakes, transmission, carburetion, differential and other parts and be on the lookout for any sound that would indicate loose or worn parts. Also notice how much of the car is held together with wire and other makeshifts. The condition of the upholstery and the finish of the body are also important considerations in the buying or selling of a used car. The top, if there is one, should be inspected as well. If there is an electric starting and lighting system it should be gone over as thoroughly as possible.

If the prospective purchaser is not well informed on automobiles, and there are some few who are not, even at this date, it will pay to secure the services of a capable and disinterested person to make the examination.

These are only a few of the suggestions that could be made to guide the buyer or seller of a used automobile and he must indeed be on his guard until he feels satisfied that he is not being "stung."

The Care of Ball Bearings

Keep grit of all kinds from the bearings, as it will quickly grind down a bearing, the wear depending on the amount and character of the grit.

After the bearing has been removed from its package do not permit it to lie around on dirty benches and pick it up covered with dirt and foreign substances. For this reason the bearing should not be removed from the package until it is ready to be installed in the car. If the bearings that are being removed or being put into the car are covered with dirt they can be very easily cleaned with gasoline or kerosene and this should be done in all cases where old bearings are removed from a car and before they are replaced. Clean

gasoline that has not previously been used, should always be used for cleaning bearings.

The presence of small particles of grit or dirt in the bearing will cause it to catch or stick and it will not turn freely and smoothly as it should.

What applies to the bearings holds good of the housing that hold them. They should be absolutely free from dirt and the threads for grease and oil cups should not be drilled or tapped out with the bearing in place.

See that the grease or oil used is clean, as dirt is quite likely to be introduced in this manner and avoid the use of greases that have talcum, mica, graphite, ground cork, sawdust or any other substance mixed with them. The balls must run over foreign matter like a stone crusher and if the balls fail to pass over, the bearing sticks.

In replacing broken or worn balls in a bearing no ball should be more than .0001 of an inch larger or smaller than the others.

Another deadly enemy to bearings is rust, and precautions should be taken to keep the bearings dry at all times.

Greases containing acids and alkalis also have a destructive influence on the bearings and the containers as it ruins the smooth, hard finish on which the life of the ball greatly depends. For this reason animal oils or greases should not be used as they become rancid in time. A neutral mineral oil or grease is the best lubricant for bearings and, in fact any other machinery. Also use a lubricant that will not become thin and run when the bearing is subjected to heat as trouble will naturally result.

Distortion of the ball retainers should also be guarded against and in removing or replacing balls the retainers should be handled carefully.

Replace all balls that are broken or ones that have the appearance of being worn as soon as possible, as worn or broken balls shorten the life of the rest of the balls and the ball race.

Tinning Cast Iron.—To tin cast-iron articles, dissolve chloride of tin in water until the solution is fully saturated; this saturated solution is to be thinned down when needed for use, by ten times its volume of water. The articles which are to be tinned are to be wrapped around lightly with zinc sheet or wire and left in the solution ten to fifteen minutes. On removing the articles they are to be dried in sawdust, after washing well with clean water and brushing them with a wire brush, and then polished with prepared chalk.

Helpful Hints For The Auto Repairman

Water In Crankcase.

This is the time of the year when water condensation in the crank case is a serious matter. The more cylinders the engine has the worse the situation.

Water, a product of combustion, makes its way past the piston rings into the crankcase, where it interferes with lubrication. In the warmer weather the water in the form of steam may blow out of the breather, but when the crankcase is fanned by a cold breeze the steam condenses into water, which contaminates the oil. The remedy, of course, lies in draining the oil about every four weeks and filtering it. In some eight and twelve cylinder engines more than a pint of water may be removed under certain conditions.

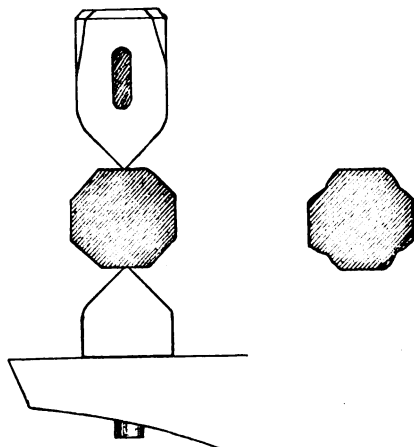
Don't Use Ammonia.

Some car owners are using ammonia solution to brighten up the hood when the latter had become dull. This is bad practice, though the immediate results seem to be good.

Ammonia destroys the finish and should not be used, in fact bodymakers and varnish concerns give strict instructions to keep the car away from stables and barns so that ammonia from the manure will not injure the body finish.

About Head Light Diffusers.

Some of the light diffusers or devices designed to redirect the rays of light, are designed to be effective only when in a certain fixed position. Vibration may so



FIGS. 1 AND 2—CREASER FOR FORMING FLUTES ON OCTAGONAL BAR

loosen the glass in the rim that the glass will be permitted to creep around in which case the whole scheme fails. Not all headlights have means for anchoring the glass permanently, so it is a matter for the owner's attention to see that the glasses are properly fastened in place. If screws are used, it might do to insert a lock washer under each one.

Stopping Plug Leaks.

There still are a great many engines without detachable cylinder heads and these use valve plugs. These plugs often leak. This leaking may be stopped by spreading ordinary paste stove blacking over the threads. Do not use too much. This may be used at any hot joint in place of white or red lead and is much better because it does not make removal of the part an hour's job.

Fitting Pitted Valves.

The owner who does his own work on the car will find that valves which are

pitted may be easily and quickly refitted by having a local garage or machine shop cut a new face, the lathe being used for this purpose. This is a matter of a scant five minutes' work, whereas grinding in until the face is clear, may mean hours of tiring work. Of course, the newly cut valve will have to be ground to its seat, but this is not a formidable task.

Sticking Clutch.

The clutch pedal of the Ford car occasionally refuses to spring back after it has been pressed forward firmly. This is due to binding and may be remedied by screwing the adjusting screw on the opposite end of the pedal shaft a turn or two.

Adjusting the Carbureter.

When the carbureter needs adjustment, it is usually best to set the needle valve for best operation at low speed. Then speed the engine up and regulate the tension of the auxiliary air-valve spring. Be sure to remember that a rich mixture will cause more trouble than a lean one.

Smoke from the exhaust will make known the fact that you are using too much "gas." Smoke from too much lubricating oil should not be confused with that caused by too rich a mixture, however, for the smoke from the lubricating oil is blue, and that from a rich mixture a dirty black. Too lean a mixture will cause the engine to sputter and pop in the muffler with a great noise. This is not harmful, but if the mixture is extremely lean, the motor will not develop its rated power.

Dressing Quarry Drills

R. L. SWARTZ

Without a few swages, creasers and shapers, the smith will find the dressing of quarry drills rather an annoying proposition.

In forming a bit on the end of a plain bar of steel, the first tools required will be a top and bottom creaser for starting the flutes which form the point of the bit into a cross as shown in Figure 1.

The octagonal bar should be heated and upset enough to square up the end, and then the crease started in the middle of opposite sides of the bar, as in Figure 2; then the crease should be started on the two other sides of the bar—leaving one side to stand between the creased sides to form the backing for the corners. This crease should not extend very far above the flare of the bit. (Fig.

An ordinary square-faced set and a top-and-bottom-swage will now come into play. The ways through the swages (Fig. 4) should be tapered a trifle, the steel being worked with the point of the bit toward the narrow end of the ways. When the bit has been brought nearly to shape the cutting edges may be formed, either by forging or chipping to an edge. To square up the edge so that all four cutting edges may be even, a shaper (Fig. 5) with two deep "V" shaped grooves crossing each other in the center of its face will be

required. One end of the bar is placed against a solid block of wood or against a post or sill of the shop,

the edges of the bit placed in the creases of the shaper and the shaper driven with a hammer or sledge that turns against the cutting edge of the bit.

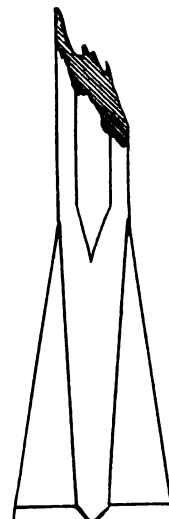


FIG. 3 SHOWS LENGTH OF CREASE

This is a very important matter because a bit that is nard enough to drill very hard rock is apt to break when one wing of the bit receives the whole thrust from the steam head of the machine. This is bad enough of itself but the broken steel at the bottom of the hole ruins the edge on the other three wings of the bit.

Another important matter is to see that all four wings are as nearly as possible the same width from center of bit to corner of cutting edge. And if a bar is backed on less it should be straightened.

Bits are usually dressed and gauged in sets, each bit in the set being the length of the feed-screw of the machine longer than the one before it. Gritty rock wears down the corners of the bits so that each succeeding bit in the set is made a trifle

smaller than the one before it so as to prevent the bit from sticking when it is started. This reduction in size should be determined by the amount

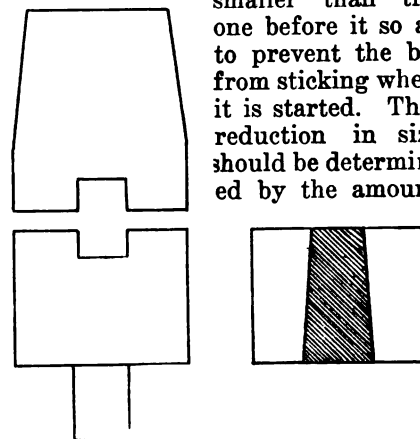


FIG. 4—TOP AND BOTTOM SWAGES THAT HAVE A SLIGHT TAPER

of wear in drilling. The bit should be as wide as it is possible to permit and follow the hole properly.

Work the steel at as low a heat as possible. Do not hurry your heat. Good steel requires care and a reasonable amount of time in heating and working. Do not forge too long after the heat has passed.

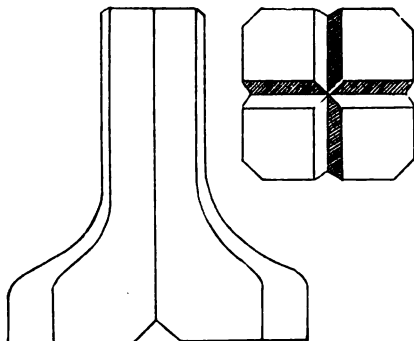


FIG. 5—THE SHAPER FORMS THE CUTTING EDGES EVENLY

In tempering make the bits as hard as they can be and stand up to the work. A good plan is to harden and draw to a copper color.

If the steel is hard and glassy a little borax in the brine has a tendency to toughen it.

In resharpening dull bits begin by squaring up the edge with the creased shaper to drive back the center even with the corners or nearly so. This will spread the bit a trifle and when the corners are driven in to gauge or a trifle under, drive up again with the shaper when you will find the edge is sharp to the corners—unless the bit has come out very dull.

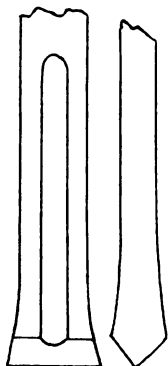


FIG. 6 MAKES YOU THINK OF A WELL DRILLING BIT

If the rock is not seamy and one has not time to keep the bits in the four winged shape, bits dressed in the shape of fluted well drilling bits (Fig. 6) can be made to do the work, using a top and bottom fuller for forming and keeping open the flutes. The angle at the cutting edge should not be sharper than the corner of a square. In forming the head or chuck end of a bar use another drill for a pattern and forge to shape, then finish between round swages of proper size.

It would be well to have an idle chuck and piston rod, or a machine head to line up by. In doing this place the machine head of piston rod in such a position that the machine head is stationary, put the bar in the chuck and turn the bar by means of the chuck—straightening as needed till the center of bit does not vibrate on being turned.

In straightening by means of a chuck and piston rod, fasten the

bearings, which may be of wood, to a plank or bench. Draw bearings close on the rod; just tight enough to permit the rod to be turned. The rod is turned and straightened as needed until the center of the bit is stationary when turned.



FIG. 7 IS THE KIND OF MONKEY MENTIONED

Another Form of Bit for Quarry Drills

This bit is a modification of a form of bit used in '79 or '80 by my father on a light string of well drilling tools.

The rock was uneven in texture and lay in thin seams with softer slate between causing "monkeys" (Fig. 7) to form at the bottom of the hole. It was thus a little difficult to keep a straight round hole with the thin sharp bits then in use in that part of the country. As the material was not very hard a couple of gouges were bolted to the shank of an old bit—so as to cut just at the circumference of the hole at the bottom. For such material the bit was a success.

In September number of **AMERICAN BLACKSMITH**, page 304, Fig. 3, is shown a pattern called the "Simmons Bit" that is nearly like the pattern I have in mind. Here is the pattern I would recommend. (Fig. 8). This pattern will keep a level bottom on the hole and also chip the rock at the circumference of the hole at bottom as well as hold the chisel bit to center.

It is at the outer edge of the bottom of a hole that a bit has most cutting to do and it is here that nearly all of a driller's trouble begins whenever the bit leaves blocks or "monkeys" stand about the edge of the hole.

STEPS TO VICTORY.

For every American enlisted to take an active part in the present war, fifty Americans remain at home. How can these fifty, month in and month out during the war, help the nation take the steps necessary to victory? The question of the supreme duty of the citizen not called to military service is one that every true American has asked himself many times. "I want to show my devotion; I want to express my patriotism in some tangible

form," is a statement we all have made. In seeking out hard tasks to perform, some of our citizens have, indeed, found an expression of their patriotism in duties that are proving of inestimable value to the nation. The tremendous progress in our war advancing activities is evidence of that.

All of us have found the opportunity to undertake hard tasks, however, and in looking toward them from a distance we have felt constrained to ignore the small tasks at hand, because they were, seemingly, so insignificant. Yet after all, it is in the performance of the relatively small and simple tasks that the majority of us will have to be content in carrying out our part of the war.

It is a broad statement, yet a true one, that America's first great victory will be won when the personal advantage and the personal privilege of each of us have been submerged in unselfish devotion to the common cause. This first great victory will be won, then, when we have determined for ourselves the degree in which we shall recognize two fundamental duties that rest upon us, duties of regulating in our individual lives the Things to do and the Things to do without during the progress of the war.

Thousands of men and women, if age and sex permitted them to go to the front, would serve as well as any who have already gone. Love of country would on the battlefield find in them its highest expression. But because they remain at home, and because they do not wear the badge of service, their own part in the greatest contest ever fought by the nations of the earth has not been brought directly home to them.

It is not a very heroic part to play, determining for oneself the things to do and the things to do without in war time. Heroic or otherwise, the determination must nevertheless be made. So it rests upon us at home to make the determination. This war will not be won by the naked bravery of those who carry our colors to France; he is lacking in imagination, and in knowledge of economic facts as well, who fails directly to associate the elements of business and financial life with the vital elements of the war. The strength and prowess of individual combatants counts, but there never was a time when war's success depended so much on the organization of the economic resources of the nations engaged.

The sort of valor that is required of us in the performance of our duties at home ought not to be a very great strain on our patriotism, particularly when we come to appreciate how much this sort of valor has its definite place in the war. As compared with the past, the difference of modern warfare is after all only a difference of degree. In the primitive state of society the duty of those who stayed at home was perhaps more directly apparent than today; when a tribe made war every man, woman and child underwent hardship in order that the fighting men might be fed and armed.

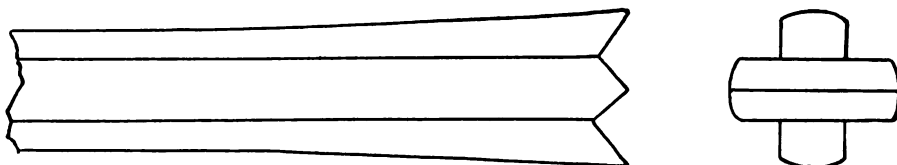


FIG. 8—THE CUTTING EDGES SHOWN PREVENTS FORMATION OF MONKEYS

The Army Horse Shoer

52. *Selecting the shoe.*—The foot having been prepared, leveled, and made ready for the shoe, estimate the size of the shoe required. To do this it is necessary for the beginner to place it on the foot and note the position of the nail holes, being careful not to take a shoe in which the last nail hole will be in the rear of the bend of the quarter. Take the lightest shoe of the desired size that may be available.

Now examine the pritchel, and if it is not of the proper shape point it.

53. The successive steps in fitting the service shoe should always be taken up in the following order:

1. Draw the toe clip.
2. Make the necessary changes in the toe.
3. Open the nail holes.
4. Shape the quarters.
5. Cool and make the first trial for fit; at this time make the seat for the clip.
6. Make any change in outline.
7. Draw the heels.
8. Cut off the heels.
9. Finish the heels.
10. Level the shoe.

Drawing the clip.—Having procured a shoe of the desired size and having noted the general changes to be made in its shape, especially at the toe, place the toe of the shoe in the fire, ground web down. When the toe is white hot take the tongs in the left hand, seize the shoe near the heel on the side nearest you, remove it from the fire and place it on the face of the anvil ground web up, center of toe projecting over the anvil about an eighth of an inch, heels held at an angle of about 30°. With smart strokes with the pein of the hammer drive down the center of the toe until a small shoulder appears underneath; place this shoulder against the far edge of the anvil, holding the shoe so that the heels form an angle of about 45 degrees below the face. Hold the right hand low and with strokes toward you along the face of the anvil, using the back edge of the face of the hammer, draw out the toe clip, bringing the heels closer to the anvil as the clip is drawn. Be careful that the clip is in the center of the shoe. The clip when finished, should be a little higher than the thickness of the shoe.

54. *FITTING*—The toe is then opened as may be necessary (par. 19) being careful not to injure the clip. To open the toe of a large shoe where the horn of the anvil is too small for the usual method, hold the shoe as shown in paragraph 19,

but pull the quarter on the side opposite you firmly against the horn. Then strike on that quarter near the toe, bringing the hammer toward you and keeping up the pull on the tongs. The other side is opened in a similar manner after reversing the shoe. This method is frequently used in fitting the very large shoes required for horses of siege gun batteries, etc.

In the service shoes it will not be necessary to use the countersink for nail holes, because the crease is wide enough to take the nail head. Use the pritchel to open the holes, as in paragraph 15, but pritchel the upper surface first in order to give the nail holes the proper slope and to remove the slight burr left on the machine punched shoe, and the lower surface last, so that the hole will be finished in the shape of the nail. For the first work the shoe may be placed anywhere on the face of the anvil, because the service shoe is thick enough to prevent any chance of spoiling the point of the pritchel; but for the last work the pritchel or the hardy hole must be utilized, as previously explained. The toe clip generally makes it difficult or impossible to place the nail hole nearest the toe over the pritchel or hardy hole. For these holes shift the shoe to the nearest end of the face of the anvil and hold the nail hole slightly outside of the edge.

It will generally be found that the work up to this stage can be done with the heat remaining from that required for the toe clip. Beginners, however, may find it necessary to re-heat the shoe in order to open the toe. In this case place the shoe in the fire with the clip up in order to prevent burning it.

Cool the shoe and apply it to the foot. In order to secure a neat fit at the toe it is necessary to make a seat for the clip, which will otherwise stand out its full thickness. Now is the time to prepare this seat. Place the shoe in position with the clip accurately centered, and, using the knife scratch a small mark on the edge of the wall at each end of the clip. Put the shoe aside and carefully whittle away the edge of the wall between the two marks. Work slowly and test frequently by replacing the shoe so that you will cut away just what is necessary and no more. (See Seedy toe, Par. 85).

Now make the first trial of the fit. If the toe is correct, note where either of the sides need reshaping. The quarters will usually be found too full and, if so must be heated and shaped over the horn by the

method explained in the plate shoe, except that the shoe is slightly turned so that blows will fall on the edge of the upper surface in order to avoid closing the crease.

The outline of the finished shoe must exactly follow the outer edge of the hoof to the last nail hole, and gradually widen from that point so that about an eighth of an inch of the upper surface will show at the heel. If, however, a foot is found to have a portion of the wall broken off when the animal is brought to the shop, the shoe must be fitted so as to follow the original outline of the wall. Fitting the shoe so that the nail holes will fall on the white line is a good guide for outline in the case of a bad break. If the toe has been broken, the shoe is fitted as just explained, but, of course, there are no nail holes to act as a guide. The toe clip is omitted and side clips are used if necessary.

The bearing surface of the shoe, upon which rest the wall, the white line, and not more than one-eighth of an inch of the sole, must be level, fit exactly to the hoof (without any air space), and extend back even with the bulb of the frog. The part of the upper surface inside of this bearing surface must be concaved (hammered down while the shoe is hot) in order to avoid any possibility of sole pressure which would produce lameness. At the heels there should be no concaving, but the sharp inside edge should be slightly rounded. (Par. 86).

The width of the heels of all finished shoes must conform to the width of the buttress. In shoeing a foot with a very wide buttress it is often unnecessary to draw the heels at all, but in most cases they must be drawn as explained in the plate shoe. (Par. 12.) Remember that the bearing surface of the shoe *must cover the buttress* and you then have a guide for the width of the drawn heels.

In the issue shoe, the outer edge is beveled as far back as the end of the crease, but is square from that point to the end of the heels. In *finishing* the shoe, bevel the square part also.

The Calked Shoe

55. The service shoe, as previously explained, is issued with heels sufficiently long to permit its conversion into a calked shoe.

To turn in a heel calk.—Heat the heel to a white heat. Remove the shoe from the fire with the tongs holding it near the toe; place the shoe at any convenient part of the face of the anvil with the ground

surface down, a half to three-quarters of an inch of the heel projecting over the edge and turn it at a right angle to the shoe. The height of the heel calk should correspond to that of the toe calk. The calk is squared by working on the face of the anvil; place one side on the face and strike on the upper side.

To weld on the toe calk.—The issue toe calk has a sharp nib or point on that surface which is applied to the ground surface of the shoe. Heat the toe of the shoe to a cherry red, and placing it on the face of the anvil with the ground surface up, hold the calk with the tongs across the toe and far enough back so as to allow for turning the toe clip. Strike a few light blows to drive the nib into the shoe until the calk and shoe are *nearly* touching.

Return the shoe to the fire, calk up, and tilt or rock the shoe forward and back to insure equal heating of both shoe and calk. When the proper heat—fluxing—(see Heat) has been obtained place the shoe on the face of the anvil as before and strike a few light blows on the calk.

Reheat to the welding heat and place the calk on the face of the anvil. Strike a few heavier blows on the upper surface of the shoe directly over the calk.

FITTING—The calked shoe is fitted in the same manner as the service shoe, with the exception that the heels are made a little longer and are slightly turned out from the end of the buttress in order to give a wider support to the foot and to thus prevent as far as possible the rocking of the shoe. For use on ice the calks are sharpened, but a horse so shod must never be turned loose with other horses.

Nail Driving

56. The nails issued in the mounted service are machine made, and the sizes in general use are Nos. 4, 5, 6, and 7. No. 4 nail is used for plate shoes; No. 5 nail for a No. 1 and No. 2 shoe; No. 6 nail for a No. 3 and No. 4 shoe; No. 7 nail for the large feet of some artillery horses.

One side of the shank of the nail is flat; the other side is concave and also has a bevel near the point. This bevel, as it enters into the horn, forces the point of the nail in the direction of the other side (flat side). Therefore always hold the nail with the flat side toward the outside edge of the shoe.

By driving nails into the wall of the foot some of the horn tubes are destroyed, and the higher the nails are driven the greater the injury to the wall. Nails should, therefore,

come out at a height just sufficient to hold the shoe, — not exceeding one inch—and in order to damage the wall as little as possible both the size and number of nails should be as small as will accomplish this object.

The outside of the white line is the correct place to start the nails and shoes should be fitted with this end in view. Nails thus started come out evenly on the wall, are low, and at a strong angle.

To the experienced shoer the feel and the sound of the nail and the amount of force required in driving are important guides.

The nail is held between the thumb and fingers to steady it in starting, and, if going properly, it imparts to the fingers a characteristic sensation called, "the feel of the nail." A nail driven into healthy horn gives off a distinct sound which the shoer soon learns to recognize. All nails going properly must be driven with considerable force. A nail driven with slight resistance, i. e., "going easy," is either in an old nail hole or *serious damage* is being done because the nail is entering the soft sensitive structures of the foot (pricking).

Nail heads must be sunk in the crease until they are flush with the ground surface of the shoe. If this is not done, the heads may project unevenly and throw the foot off the level. They will also wear quickly and cause a loose shoe.

Securing the Shoe

57. The shoe is placed upon the bearing surface of the foot and held firmly in position with the left hand, back up. A nail is placed between the thumb and forefinger of the left hand, *the flat side faced outward*, and the thumb and the fingers are then extended along the right side of the shoe until the nail is held squarely in the center of the most convenient nail hole, usually the third (the third hole on the left side for a left-handed man); with a toe clip on the shoe the second nail hole is generally used. The nail head is tapped lightly with the driving hammer. The nail should be held firmly to determine the feel, and the thumb and forefinger should not be removed until the nail, going soundly, needs no further guidance. The shoe is then grasped more firmly and the nail is driven with slightly increased force. The fingers, placed on the wall of the foot, determine the exact location at which the nail emerges.

With the claw of the hammer the point of the nail is then bent upward until it stands at a right angle to the wall. Next, the head of the hammer

is grasped in the hand and the claw is pushed firmly downward, clutching the nail point. A half turn downward and a slight pull wrings the point off close to the wall, leaving enough nail to form the clinch. In wringing off nails the hammer is held in the hand nearest the nail point.

As the first nail when driven may cause the shoe to shift, it is essential to place it exactly in the center of the nail hole. If the shoe has altered its position on the foot a pressure on the opposite side of the shoe by the palm of the hand and a few light blows of the hammer on the lower border of the wall where the first nail is driven will move the shoe back to place.

The second nail should be driven on the side opposite to the first nail. When these two nails have been driven the foot should be allowed to rest upon the floor, and the foot and shoe should be carefully examined from all sides. Is the position of the nails correct? Is the foot axis correct? Does the shoe fit properly? Is its length correct? Does the horse stand evenly upon the ground surface of the shoe? The shoer should not resume his task until he is satisfied in all particulars. If any irregularities exist this is the time for correction. When the shoe has been properly set drive the remaining nails, the fourth nails on either side being driven first. As each is driven the point is promptly wrung off. When all the nails have been driven the heads are forcibly hammered well into the crease, securing the shoe evenly upon the foot, being in length about the width of the nail at this point.

The clinching block is then placed under a nail point. When the driving hammer strikes the nail on the head the nail point is turned upward and the clinch is formed.

After all the clinches have been formed the foot is brought forward upon the knees. (See Pl. V, fig. 3, for front foot, and accompanying figure for hind foot). With the rasp the clinches are made of equal length, and a slight groove is made in the wall under each clinch. With the clinching block held firmly under each nail head in turn, the clinch is bent down and hammered in with the driving hammer. It is well to clinch the inside of the foot first, thus removing danger of the upturned clinches tearing the opposite leg. Finally, the smooth side of the rasp is run lightly over each clinch to take off the rough edges that would pick up bedding or other material.

(To be Continued)

Queries-Answers-Notes



THIS department is the meeting place where you are free to ask for information, answer questions, discuss shop matters and business conditions and any other notes you feel would be of interest to a fellow mechanic. Make use of this Department as often as desired.

Wants to know how to make Fish Spears? I wish to ask through the Queries, Notes and Answers column which is the best way to get prongs on a fish spear when made from an old four or five tine manure fork.

Is there some craftsman an expert on the manufacturer of fish spears? We shall be glad to hear from you.

John Schaffer, Minnesota.

An Up to Date Tennessee Shop—Elsewhere in this number is a picture of the interior of the shop of G. O. Tankersley, of Tennessee.

Mr. Tankersley has a power shop and is equipped with a six horsepower I. H. C. gas engine, emery stand grinder, No. 16 power drill press, forty feet of line shaft, Buffalo woodworker, and a complete line of blacksmith and woodworking tools, Prest-O-Lite torch, and rubber tire machine. The size of the shop is 30 by 60 feet.

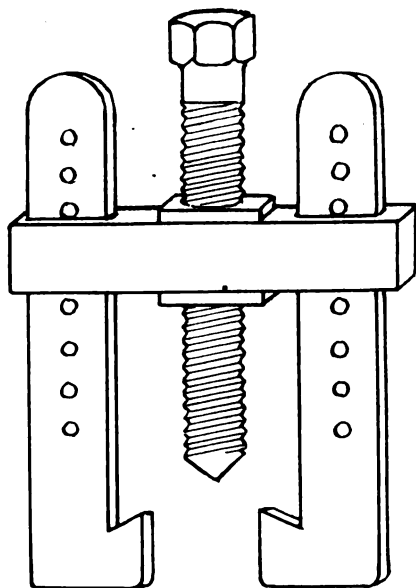
Ajax Forging Machines—I would like to hear from some one on the different kinds of work done on the Ajax forging machines and dies for the different work.

A. B. Ross, N. J.

Adjustable wheel and gear puller—The accompanying sketch illustrates an adjustable wheel and gear puller that has been used by O. J. Bilger, of Texas, in automobile work.

The puller can be made to suit individual requirements and in addition to serving as a gear puller it will do the work of a light arbor press.

Business in Nebraska—A few lines about



ADJUSTABLE WHEEL AND GEAR PULLER

business conditions in this community, I take it, will be of interest.

I have had a fine business this winter in shoeing. Myself and helper did \$550 worth of shoeing from December 7 until January 1.

I get \$3 a team for resetting all round, \$5.50 and \$6 for corn shoes per team, \$7 and \$8 for Never Slip and put in four calks for 25 cents. I have not yet arranged my prices for plow work.

The correction of faulty gaits and defective feet has been somewhat of a hobby with me and I have met with considerable success in this work. I race some harness horses during the summer and shoe the track horses.

I would consider selling a half interest in my business to the right man.

W. L. Shoemaker, Nebraska.

Finish for Storage Batteries—Would like to have a recipe for a preparation for painting the binding posts or terminals on automobile storage batteries after these have been burned into place and dressed off with a file. It does not give a finished appearance

C. E. Wilson, Missouri.

In reply—We know of no preparation that is used for this purpose as nothing of the sort is applied at the factory. If left alone for a sufficient length of time oxidation will restore the bright parts to the same color as the rest of the exposed lead. However a mixture of lampblack and turpentine applied would make an agreeable finish, but care must be used not to paint the inside of the terminals where the battery cables fit, as the paint would probably act as an insulator. The most effective thing to do in this case, perhaps, would be to rub the parts brightened by filing, with either graphite or stove polish which would darken the parts sufficiently.

Trouble with an Oakland Car—I had an Oakland car come to me last fall for repair. The trouble with the car was that it fired back in the carburetor. Three of the cylinders fire all right and the other one fires back. I have taken the car down, put in new bearings and piston rings, ground the valves and put it together again and it fires back just the same. The trouble appears to be in the back cylinder.

Ralph M. Wand, N. Y.

In reply—You mention that the original trouble with the engine was that it fired or "popped" back in the carburetor and the back, or No. 4 cylinder, refuses to fire.

I notice also that you mention having ground the valves but it is entirely possible that one or both valves in this particular cylinder are warped either in the head or in the stem. Also it may be that the valve springs are defective and again it may be that the push-rods that actuate the valves do not function properly. Go

over the valves carefully and if you can do so without too much trouble try fitting in a couple of new valves in this cylinder or if you are unable to secure new valves change them with the valves in another cylinder, but be sure and replace them in the cylinder you took them from in the first place. If this test does not locate the trouble you will be safe in taking it for granted that there is nothing wrong with the valves.

If the No. 4 cylinders misfires regularly, that is if it does not fire at the same time in every cycle of the motor, look to your ignition for the trouble. There may be a faulty spark plug or a disconnected high tension wire from the spark coil or the magneto as the case may be.

"Popping" back in the carburetor is also caused by feeding too much air into the carburetor and not enough gasoline in which case more gasoline should be fed in at the needle valve. This, however, does not seem to be the case and the indications point to either trouble in the valves or the ignition system. It may be entirely possible that the ignition system has not been timed right.

S. S. New York.

I have had thirty years continuous experience in the trade and I am always willing to learn.

Business has been good here this winter, prices fairly good and altogether have had a very successful year.

G. M. Boodey, Peninsula, Ohio.

From East Africa—Still at the front. We are having some pretty rough times up here. There is some very interesting material for pictures but have no camera. Expect to return from Natal shortly.

James Barber,

10th S. A. Horse, East Africa.

Real Co-operation—I have just received my Journal and I certainly enjoy reading it especially the article Bill Bishop wrote. What he says about "co-operative competition" sure is the truth.

There are two shops in this town. Mr. Terrell owns one and I own the other one. We came together on all prices and had large price lists printed and put up in our shops and when a customer comes in and says he can have his work done cheaper elsewhere, we lead him to the price list and tell him to "go ahead." So everything works in peace and harmony.

I say if we all would do this way we would get along with our business better.

J. A. Strowger, Florida.

Letter from a progressive Texas Reader—I get several papers and magazines, but consider the American Blacksmith the most valuable to me. It seems like a companion and instructor and I often go over my back numbers for information and "kinks" on different jobs. I have all my copies back to and including Volume II and I find there are lots of good things in the old numbers that are not yet out of date.

I can't offer any suggestion on improving Our Journal unless it would be to make it larger.

I am especially interested in Benton's Recipes, automobile work and most of all oxy-acetylene welding. I am really a comparative beginner at welding, having had my equipment but little over a year. I only know what a little experience. The American Blacksmith and a few books have taught me. While I have my first failure to make, it is a fact that I don't go very strong on aluminum work. A few pointers on working this special metal would be of great interest to me.

My shop building is 24 by 60 feet and

have what I feel to be a very completely equipped shop, I have a trip hammer, circular and band saw, emery stand grinder, drill press and blower all operated by engine power. My two forges are fitted with both hand and power blowers.

J. W. Starnes, Harrold, Texas.

Another letter from the Lone Star State—I have been in this part of Texas for almost six years. Beginning right here was my first attempt to do work of this kind. I now employ two good smiths and have all the work the three of us can handle. Others have come and gone but I'm still here and doing well, like my work and am contented.

My shop is equipped with electric motor power, the cheapest and best power there is, I believe, and driven by the motor are a power hammer, drill press, two emery grinders. My shop is also equipped to handle any sort of oxy-acetylene work and have a complete equipment of blacksmith tools.

I was glad to notice the report of the Nebraska Association convention and the prices set by them. I was glad to know my prices were right along with them. Some of my prices were a little higher and some were a trifle lower. This is one advantage in keeping in touch with other parts of the country through a well edited paper.

I work for cash only and on thirty days time and I find that we get just as much business as though we worked for credit and extended credit to anybody and everybody.

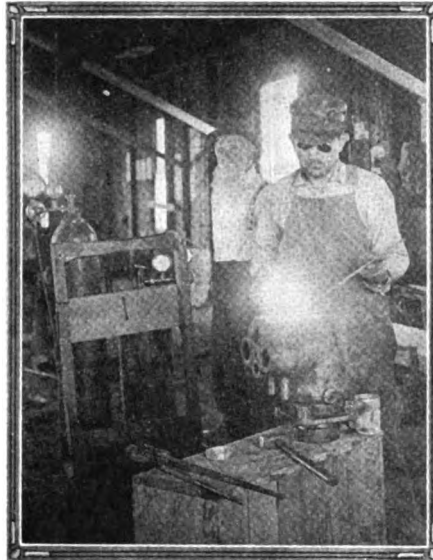
Besides our general work we handle a great deal of automobile repairing, welding, etc., and find that this class of work pays well. We keep busy all the time and let the other fellow fight the booze and cases and discuss.

T. O. Calvin, Texas.

Changes in the Craft—The New Year season has brought to mind much that has passed and casts a reflection of much that is to come. Nothing could give a clearer outline of the changed conditions among the smiths than a perusal of the past volume of Our Journal. Ten or fifteen years ago its columns were devoted largely to assisting a thousand men working along a thousand different paths, helping one here and there out of a difficult job and fostering the spirit of organization and cooperation struggling into life.

Always somewhat ahead of the conditions it was helping to change for the better until it is now a journal, edited to meet the needs of men, many of whom are highly specialized in their calling and conducting their business along strict business lines. Just as its columns have advanced to articles that are scientifically treated by masters in their respective lines so the old shop has in many instances given place to a large and convenient building, equipped with power and modern tools which have superseded the hand hammer and cold chisel much as new business methods have replaced the slip shod guess work of old. The old shop is fast becoming but a memory, nevertheless it is a memory all of us would loth to part with. What man but remembers the old shop manned by one smith and a helper, usually willing and competent to tackle any old job under high Heaven, anything, from welding a four inch shaft to filing a horse's teeth, from over hauling a threshing machine to soldering a new bottom in a tin milk strainer.

The man whom we all envied, who sharpened our skates, made our fish spears



CYLINDERS DON'T FREEZE OFTEN IN TEXAS BUT WHEN THEY DO, J. W. STARNES IS ON THE JOB

from broken pitch forks, broken sometimes it may have been with malice aforethought to be available for our needs, put new tubes in our muzzle loading guns together with the thousand other things that made a boy's life really worth living.

Standing once more at the beginning of another New Year that divides the past from the future we turn, it may be, with something of regret for the days that are gone, and accept in their stead a pride and ambition for the ones that are to come. So while we join in wishing each other a Happy New Year here's "hoping" with regards to "the Old and luck for the New."

Wm. K. Bell, Arkansas.

Says one issue is worth price of year's subscription—"Now, as to my candid opinion as to the merits of the American Blacksmith, just tell your subscribers that I think it is O. K. I have often found that one issue has been worth the price of a year's subscription."

T. J. Teter, Texas.

A Pair of Plow Tongs—For holding slip shares when sharpening or pointing there are in use among smiths quite a variety of tongs from the common straight tip to a frame to be bolted to the share. The writer herewith submits the description of a pair for this work that has merit. The accompanying cut should give a good idea how they are made. The lower jaw is long, narrow and rather thick. It is slightly curved and the inside, or gripping surface leveled to fit snugly to the throat of the share. The other jaw is wide, rather thin and made long enough to turn the end to one side and then turn end of offset down to lap over the edge of share. When properly shaped they will hold, without slipping, any size and make of slip share.

W. K. Bell, Arkansas.

Painting a Touring Car—I have to paint a big touring car that is in very good

shape. I think it only needs the cleaning preparation and one or two coats of color and then varnish. Will this color I put on in the ordinary way, mixed with turps, stick to the old surface and last, or should a small quantity of linseed oil or rubbing varnish be used?

Harry A. Boyer, Illinois.

Replying to the above, the surface of the car should be thoroughly gone over to determine the presence of renovating or polishing mediums. If these are found, then in addition to the usual washing processes, it will be necessary to first wash with gasoline and then with turpentine. For good work, rub the surface with water and pulverized pumice stone, after which wash down very thoroughly, and after drying it, is then ready to color.

To reduce the expense, the surface can be sand-papered with No. 1/2 paper, instead of rubbing, as above. For first coat of color use a japan ground color, which should be mixed and thinned with one part of pure, raw linseed oil to four parts of turpentine. Thin the color with turpentine to practically the right brushing consistency and then add the oil, measuring both mediums. It is inadvisable to add varnish to the color, except when the medium is to be used as varnish color.

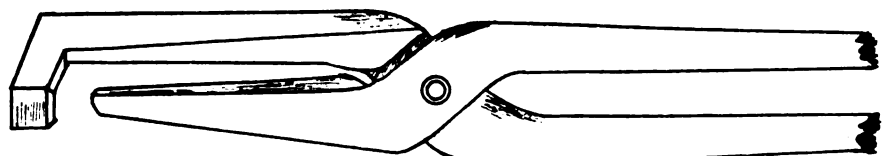
One coat of color, if black or deep green, will suffice. Make the next coat varnish color. To shop-prepare this mixture, first thin the color with turpentine to a rather thin, creamy consistency and then add the rubbing varnish, using four ounces of color to two pounds of varnish, this latter being equivalent to one quart. Use no oil in color that is to be converted into varnish color. Put the ingredients for the varnish color into a container and shake vigorously. If the surface is in good condition, perhaps this varnish color may be rubbed lightly with water and pumice flour, washed carefully and finished with a good, elastic finishing varnish.

M. C. Hillick, Pennsylvania.

Welding a Big Cylinder—Some time ago we received a big cylinder from a steam engine that required welding. The cylinder was a big one, weighing about 400 pounds and it looked as though we would have to turn the job down, but after "getting our heads together" we tackled the job in the following fashion:

We secured an old fashioned safe that had gone through a fire and had been discarded. We laid this safe on its back, removed the door, the lining and the casters, putting the latter under the bottom. In one end two two-inch holes were drilled and through them were led the pipes from the electric blower. These pipes from the blower were run out to the opposite end of the safe and were perforated with a number of quarter-inch holes in order that the air blast might be as evenly distributed as possible.

The safe, or as it had now become, pre-heating furnace, was filled with charcoal and wood, the fire started and the blowers set going. The cylinder was lifted into the furnace with a block and tackle and slowly heated until it reached a dull red. At this point the cylinder was lifted out and a bar shoved through the cylinder to



A PRACTICAL PAIR OF PLOW TONGS

hold it in place and the welding proceeded with.

Following the welding operation the cylinder was again lowered into the fire and allowed to reheat to about the same temperature it was before welding. The blower was then stopped and the fire and cylinder covered with asbestos paper and left to cool over night. The weld was perfect.

J. W. Pokorny, Nebraska.

Retinning Copper Vessels—I would like to know if you can give me any good suggestions about heating auto springs, preferably with wood—or I could get coke. I have been heating them in the forge but I thought maybe I could save time and labor by building me some sort of a furnace.

I have been getting the best grade of steel, but not tempering them, and the last ones I have made lately have fallen down. I don't know whether it's the steel or not but thought I would try oil tempering them and see how that would do. How many leaves 5/16 x 2 had a Ford truck ought to have to carry a 2 ton load?

Can you tell me how to retin copper kettles or vessels? I have trouble soldering the bottoms of milk cans where the milk has gotten in between the seams under the solder in the bottom where it is joined together. It bubbles up and leaves another hole. Can anyone tell me a good way to fix them?

J. A. Balch, Washington.

In Reply—A special article dealing with this question of auto springs appears elsewhere in this number.

Eleven 5/16 x 2 leaves are required for light loads on a Ford truck and twelve will be necessary for heavy loads.

Copper is very readily tinned and the process is easy. All that is necessary is that the surface of the article to be tinned is clean. It is then covered with a light flux of sal ammoniac or resin. Most of the soldering fluids or compounds will be found equally suitable. However, sal-ammoniac seems to be the natural flux for copper. It removes the oxide quite easily and a considerable coat of oxide may be removed with a flux of powdered sal-ammoniac and powdered borax and a little resin rubbed over the surface of the copper by means of a heated soldering iron.

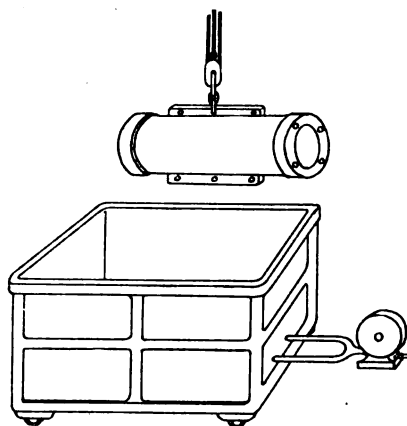
Usually better results are obtained if the object to be tinned is brightened by filing, scraping or rubbing with sand paper or emery cloth. After cleaning in the manner suggested and applying the flux the tinning is carried out with the soldering copper using ordinary soft solder. Naturally this method of tinning would be out of the question if there were any great amount of it to be done in which case some special tinning baths and tools would be required.

It is likely that your soldering difficulties have been caused by more or less moisture that is present in the seams of a milk can. Naturally the application of the hot solder to a seam that had some moisture underneath it would result in the formation of steam that would cause the bubbles in the solder you mention.

Try drying the portion to be soldered thoroughly and solder in the usual way with a resin flux.

Prices in Jersey and an Experience—I have a shop in a little town of 250 inhabitants and as there is no other shop within three miles I have quite a scope of territory.

My prices for common shoes from 0 to 4 is \$1.75; No. 5, \$2.75; No. 6, \$2.25; Never-



HOW THE DISCARDED SAFE WAS CONVERTED INTO A PRE-HEATING FURNACE

slips, 0 to 4, \$2.50; No. 5, \$2.75 and No. 6, \$3; re-setting, 80c; re-calking, \$1.25; re-sharpening, \$1, Neverslip calks, 5/8 to 1/2, 6c; 9/16 to 5/8, 7c; leather soles, per pair, 60c and 70c. I would be interested in seeing the prices from other states.

I had an experience somewhat similar to that described by Mr. Oldenburg in the January number, only the worst of my case was that it was a Jew woman I had to deal with so I had to be very careful of what I said.

Her son brought the running gears of a carriage to my shop and told me that his mother wanted a "jagger" body made for it and wanted to know the price. I set the price at \$10 and specified the kind of wood that would be used in the work. The next day the son returned and instructed me to go ahead with the work as his mother was satisfied with the price.

After the job was finished I was met with the old cry, "will pay when we get the milk check," and in the meantime they split one of the panels and brought it back to have it repaired. I sent word when the repair was finished but they never called for it. One day I met the son and asked him when he was coming to get his wagon. He said he did not have any wagon at my shop. I tried to explain to him but there was no use, so I prepared a bill and sent it to the woman. In a few days I received a check from her for \$5 with, "for services in full," written in very small letters over "pay to the order of." I was about to give her credit for it when I noticed this small writing so I sent the check back and turned the bill over to a justice of the peace for collection. After considerable trouble, a hearing was finally held. She claimed that she never gave me an order to build the body and if her son did so she was not responsible and tried to get out of paying because the wagon was on my premises.

Right then was where my temper slipped and I told her in as few words as possible that if she wasn't responsible for what her own children were doing that I would take one and put him to work where he would pay for the wagon, but before we left the justice's office the bill was paid in full.

Howard Kelenbenz, New Jersey.

Welding a Stove Water Jacket—I would like to ask some mechanic with an oxy-acetylene welding outfit what to do with a water jacket for a stove, where the inside of the water jacket, where pre-heating the inside, being so much thicker, that when welded, the outside shrinks so much

quicker than the inside and by having asbestos on the inside the heat of the outside of the jacket will not hold.

H. F. Schroeder, Michigan.

In Reply—Replying to the above, the water jacket should be placed in a charcoal fire, no blast being necessary, and heat to a dull red, so that the metal has reached its limit of expansion. Make the weld with the casting in the fire and cover with asbestos paper and then allow the casting to cool in the fire. In this manner all parts of the casting will cool at the same time, the contraction will be equal and the weld will not crack or leave go.

If the casting is removed from the fire while welding or while cooling the unequal contraction of the thick and thin sections of the casting will be sure to result in cracking. The secret is to keep the casting hot until welded and to allow very slow cooling.

S. S., New York.

Cutting Concrete with Oxy-Acetylene Torch—Can any of your readers give us any points on cutting cement or concrete with the oxy-acetylene torch?

James English's Sons,
New Jersey.

In Reply—We do not believe it possible to cut concrete with the cutting torch. Unequal expansion and the more or less enclosed moisture that is always present in concrete, or cement, causes a violent action that sometimes expresses itself as a small explosion; much in the same manner as heated stones will act when subjected to great heat. Never weld on a concrete floor unless you are certain there is no moisture whatsoever left in the concrete, and this is practically impossible to ascertain. In fact it is a bit dangerous to subject concrete to the intense heat of the oxy-acetylene flame, as bits of concrete are liable to fly about in all directions and with considerable force. About the best thing yet discovered for breaking up concrete is the old fashioned and reliable sledge hammer.

S. S., New York.

Insulation Repair.

When on the road it is found that wiring insulation is broken with all its attendant troubles, the injured insulation may be quickly and easily repaired by using a small quantity of the tar which is to be found on top of the battery. Melt the tar and while it is hot, spread it over the break in the insulation and cover the whole job with a piece of cloth. Of course, if electrician's tape is at hand this may be used to repair the break; indeed this is precisely the sort of service for which the tape is intended.

Removing Overhead Valves.

In some overhead valve engines valve grinding is made a harder task than it should be, because when the valves are removed the owner dismantles the rocker arm assembly. In most engines this is not necessary because the rocker arm can be disconnected from the vertical rod, pushed to one side and the valve removed. In engines using cages this is particularly easy though most owners go to the trouble of dismantling the rocker arm assembly. To push the rocker arm aside use a flat wrench with a pair of pliers at one jaw to twist with.

Leaky Piston Rings.

A good check on the condition of the piston rings may be had by feeling the crank case. If it is hotter than usual, it is probable that there is leakage past the rings, which either are worn or stuck in their grooves because of carbon deposits.

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SELF-ACQUIRED KNOWLEDGE.

A successful business man in New York retired recently. He had worked his way to the top of the ranks of the great national business organization which he had served for forty years. The city editors of the newspapers, smelling a story, turned their reporters loose on his trail. They figured that he would have something to say about the secret of success, advice to young men, how to become rich, etc.

This same thing happens daily in practically every town in the country, to a greater or less degree, and somewhere in this country of ours, reporters are forever engaged in prying the "secret of success" from some big man who has made good and is laying down the reins.

Ninety-nine times out of a hundred the reporters get a few columns of generalities, mixed with a lot of maxims and other guff that no one, not even the successful man himself ever followed.

The secret of success, if there can be said to be such a thing, is really nothing more than the manner and method of applying one's spare time and the information he gathers about his own particular line outside of working hours. Few employers will suggest it to him and he must do it on his own responsibility. He cannot even be certain of an immediate dollars and cents return for the effort. This information must be absorbed at the risk of the ambitious man, but he will learn, in the long run, that it is the self-acquired knowledge that enables a man to get ahead.

The successful man in any line buys his self-acquired knowledge at something of a cost. He pays for it in an evening's reading of his particular trade journal, the ball game he passes up, the lecture that bears on his work but he receives just value for every hour thus spent and the self-gathered knowledge of one's business is precious stuff.

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Free Tractor Instruction—Leading manufacturers of the country are finding that the number of men properly trained to care for and operate the great numbers of tractors that are being made and sold, is far below the demand.

During the past several months the J. I. Case Company and the International Harvester Company have conducted tractor schools and demonstrations in all parts of the country.

All of these schools are free and are conducted for the benefit of anyone interested in tractors in any way — farmers, blacksmiths, repairmen and others.

No effort has been made to make sales and you will be given a hearty welcome and secure a valuable knowledge of tractors; their work and operation as well as their care and construction.

GOVERNMENT FIXES PRICE ON SMITHING COAL.

When the price fixing order of the United States Fuel Commissioner was issued on October 1, 1917, no mention was made of smithing coal as a result of which, some dealers have been taking advantage and charging excessive prices for this grade of coal.

Complaints to the commission resulted in the fixing of the price for smithing coal at \$2.70 per ton free on board cars of the open type. An additional 75 cents per ton is allowed when the coal is loaded in box cars and if a broker enters into the transaction he is allowed a broker's commission of 15 cents a ton.

The most that a ton of smithing coal will cost under this list is \$3.05; figuring that the coal costs \$2.70, that 75 cents is charged for loading into a box car and that the broker gets another 15 cents. However this price does not take into consideration the freight, demurrage, overhead and other charges that are tacked on to the original price of the coal.

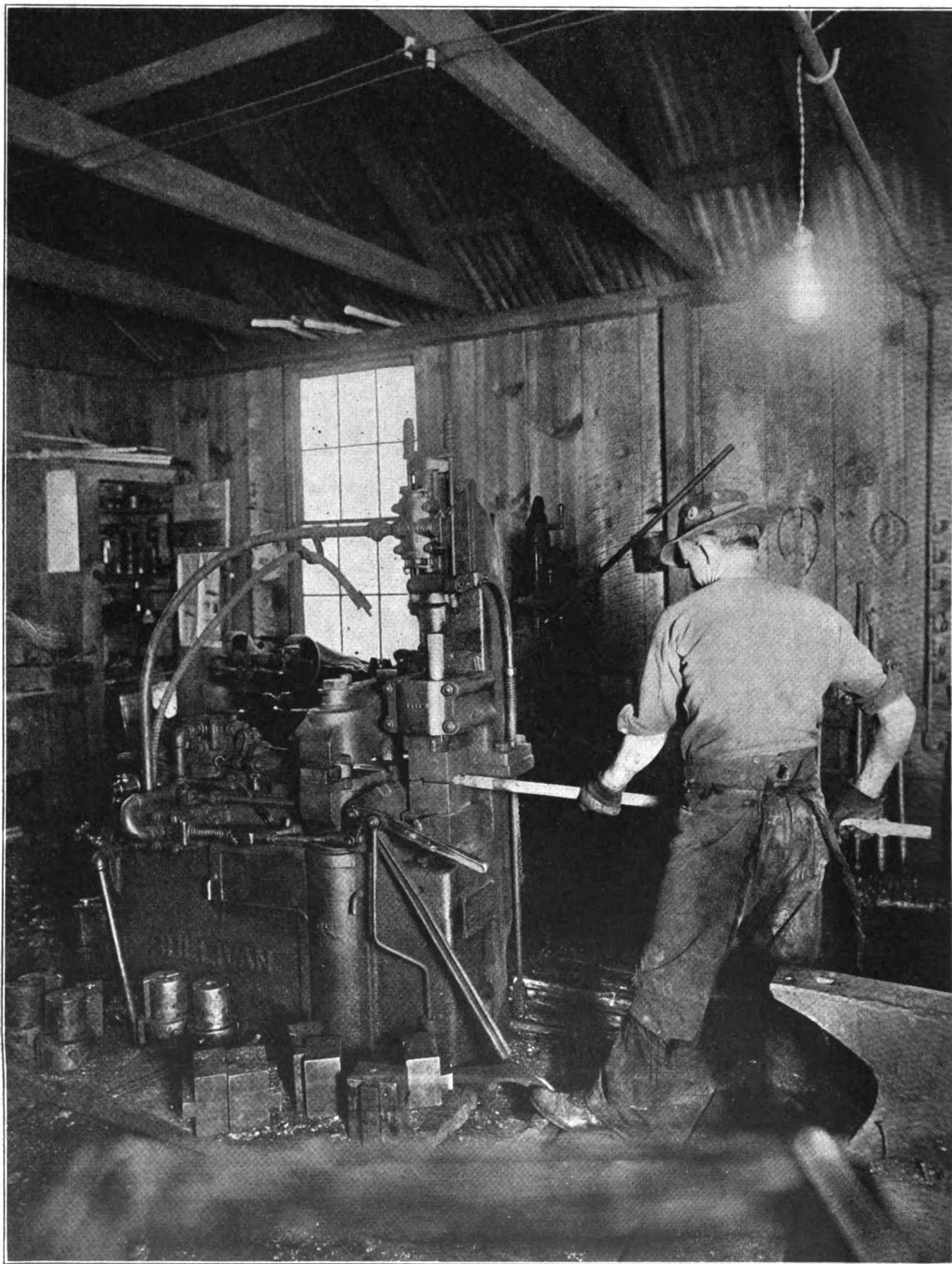
The Village Blacksmith.

Under a spreading chestnut tree,
The village smithy stood;
But that was long ago. Ah, me,
If nowadays you should
Draw near the smithy's rustic scene
And for the smith inquire,
You'd find him selling gasoline,
Or working on a tire.

—Birmingham Age-Herald.

DON'T GIVE MONEY TO AGENTS

The American Blacksmith, Auto & Tractor Shop DOES NOT employ subscription agents. Any person representing himself as such is an impostor and should be so dealt with. Notify us immediately if anyone claiming to represent this journal calls upon you.



THE PASSING OF THE DRILL SHARPENER—THE MACHINE DOES IT NOW QUICKER AND CHEAPER. SEE PAGE 159

Steel Sharpening and Quarry Operations

J. C. LAMON



WORK—plenty of it and of a kind to tax the ingenuity of the mechanic, is encountered in big engineering projects and the construction of the big hydro-electric plant, de-

scribed in this article is no exception but here too, as in most other fields these days, both time and labor are being saved by machinery.

A large force of blacksmiths is required on this latest engineering project, located in the depths of the Great Smoky Mountains, in Tennessee.

As an indication of the stupendous enterprise Figure A illustrates the quarrying operations that are carried on to furnish the foundation excavation for the monolithic dam.

Illustration B shows a section of the quarries with the excavating machinery and railroad equipment which are getting out the thousands of cubic yards of crushed stone for the concrete required. In this illustration deep well drilling machines can be seen on the bluff. It is here that the blacksmith finds most of his

work cut out for him, and a few details are given of quarry operation and the problems confronting the blacksmith and how they are accomplished on this project.

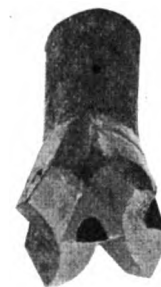
Deep well drilling machines are used to drill the blast holes. A large number of these holes are drilled in line, a uniform distance apart, and varying in depth from 95 to 125 feet in depth. After a "battery" of holes are drilled they are charged with dynamite, each hole requiring a charge of from 800 to 1,000 pounds of explosives. After being loaded and the holes filled up the whole "works" is touched off simultaneously by an electric detonating machine and the results of a blast of this character can quite well be imagined.

Great boulders of rock are blasted loose and these have to be further reduced for the steam shovels and the rock crushing machinery. To do this the rocks must be broken up by more blasting. The "shot" holes are drilled in these boulders with compressed air jack hammers.

Frequently the cable that holds a string of deep well drilling tools breaks or the tools stick in the bore in such a manner that they are left until they are blasted out, their con-

dition when recovered can easily be imagined.

The making and repair of this class of tools is taken care of with the large power hammer.



THE FASTEST CUTTING DRILL. YET DESIGNED

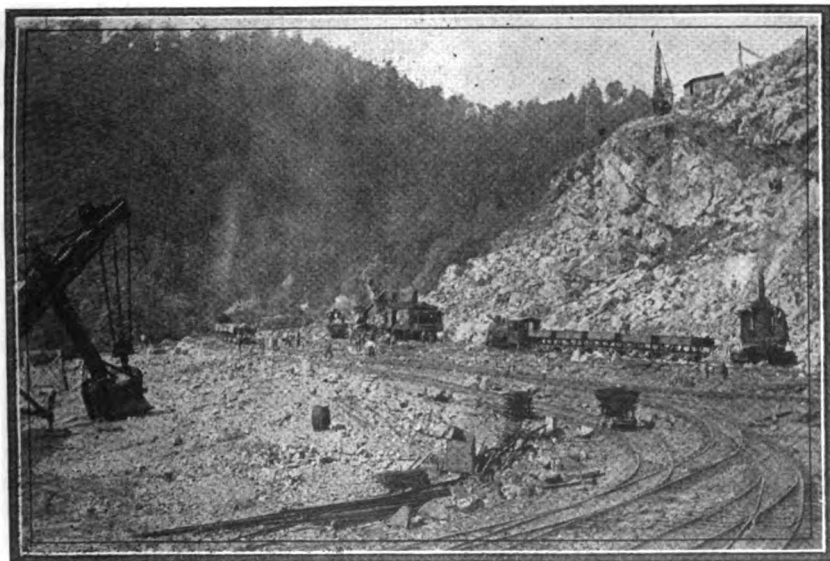
On this job hundreds of drill steels are used daily and to make them by hand would be out of the question. To take care of this part of the work several modern forging machines have been installed and are giving satisfactory service indeed.

The type of machine used, is shown with a blacksmith forging a bit in the frontispiece, and some of the work done on this machine is shown in the illustration. This is said to be the fastest cutting bit ever designed.

Forge fires are used to heat the steels both to forge the bits and for temper drawing. The initial picture shows a helper heating a "run" of bits.

In making the bits the steel is heated to about 1,500 degrees, the bit is then forged and laid aside until cold. Tempering is accomplished by heating slowly until a dull red and then being cooled in water and kept at about 70 degrees. They are then drawn to a straw color and cooled. This method has been very successful here and I might add in this connection that color blindness affects the ability of some blacksmiths to judge the tempering color properly and what appears as a straw color is likely to be something else and in cases of this sort the hardness would have to be ascertained by test.

Owing to the hard usage the steels are subjected to, large numbers are broken and would prove a considerable loss, but the broken drills are carefully sorted and welded and thus they find their way back to usefulness. The drawing shows the style of scarf, the hole being well drilled



B—QUARRY OPERATIONS LIKE THIS DEMAND SMITHING SKILL

before the weld is made. After welding, a steel rod is run through to clear out any possible obstruction.

The drills for the jack hammers are made hollow and a part of the exhaust air is conducted through the drill to the bottom of the hole and consequently the hole is kept free of chips and the drill is kept from jamming and in contact with the surface to be cut.

Some Thoughts for the Auto Repair Shop Man

E. K. SNOW

The repairman who is not located in a big town is in an excellent position for selling small cars with truck attachments or the truck attachments alone and trailers. Used cars are usually good things to consider along with the business and if a good, serviceable used car can be obtained and rebuilt into a truck the repairman usually stands to make a nice profit for his trouble. In most communities the man who is in need of a truck only wants a light truck and at slight cost and the chances are that in most cases such a truck will meet all his requirements. There is also a fine chance to sell trailers to the farmers and merchants who want to use their cars for business

as well as for pleasure.

Spring is here and with it the touring season and the transient customers who are often the ones that make the bulk of the season's business. It is a comparatively simple thing for the repairman to have a place that will be a little more inviting than the average and the owner will do well to consider the matter of making his shop attractive.

Every car owner who has done any touring can tell of instances where he had stopped sooner than he expected because of the appearance of some shop, and it pays well to make the shop the subject of some sort of sign work so that the motorist will know there is a repair shop close at hand and to assist the roadside signs or other form of advertising that is undertaken, the shop itself should be made so conspicuous that it cannot escape attention. If the motorist does not stop in passing he will usually take a chance and try to make the next repair shop on his route rather than turn back.

Here's another good idea to think about for the repairman or dealer located in the path of the tourist and that is the sale of camping out-

fits and trailers. Lately the tourists have been taking to the Ford and hauling one of these trailers with them or else carrying their camp equipment on the running boards of their cars. There are several good reasons for this and not the least of these are the poor hotel accommoda-



HOLLOW DRILLS ARE SCARFED AS SHOWN FOR WELDING

tions afforded at many places and the matter of economy. Both repair shops and hotel keepers in the past have seemed to consider that anyone traveling in an automobile is legitimate prey and can be charged accordingly, with the result that their reputations are passed all along the road and here is a case in point:

Some friends of the writer last summer took a trip that covered pretty much all of the southern and southwestern states and among the party were two expert automobile mechanics. In their travels they ran across a party in a Packard Twin Six, near Kansas City, and became acquainted with the members of this party who warned them against a certain garage in Pennsylvania that had charged them \$29 for relining a brake that had burned out while coming down the Allegheny mountains.

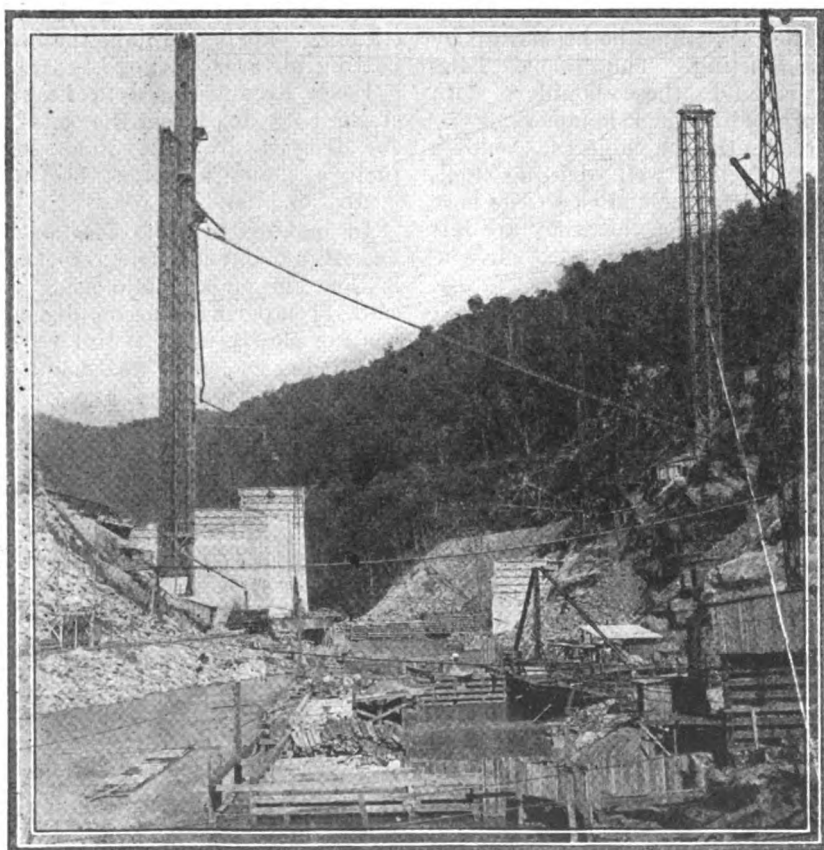
It is a long, long way from Pennsylvania to Kansas but no doubt that repairman's overcharge was reported all along the way and the man who had to pay \$29 for having a brake re-lined will caution everyone he meets against the place.

Make your charges high enough to make a good profit for yourself but don't make them too low and don't discriminate between the man who travels in a Packard and the one who is trying his humble best to get what pleasure he can out of living with his "Flivver."

When the Day is Done

I have eaten a bale
Of spinach and kale,
And never raised a row,
I have swallowed a can
Of moistened bran
And feel like a brindle cow,
I am taking a snack
From the old haystack
In the evening shadows gray.
And I'm glad, you bet,
At last to get
To the end of a meatless day.

—Washington Star.



A—CHEOAH DAM ON THE LITTLE TENNESSEE RIVER

A Band Saw Built of Odds and Ends

A. N. ESTES

AS I have been a reader of this paper for about 17 years and have never contributed an article to it, I have read many articles from others which I have enjoyed and profited by, so here is where I reciprocate.

I have three machines that I have produced out and out, and all three of them had their starting place in the scrap heap.

I will attempt to describe them in the order that I made them and the first to be described is a wooden band saw frame, patterned after a cast iron frame that I saw in a machinery catalogue and up until that time I had never seen a band saw.

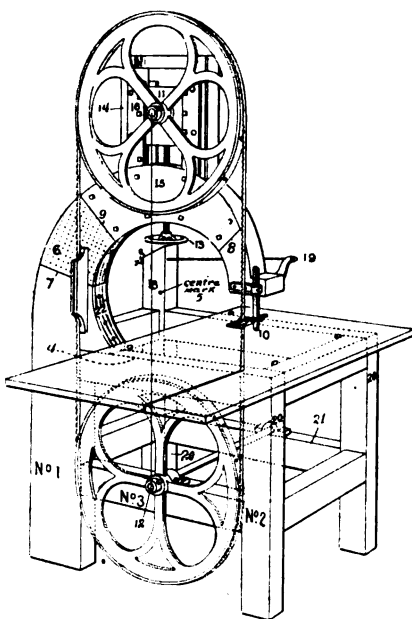
As I live in a section of Virginia where there are miles and miles of virgin forest, I have wagon timber that has been cut for 18 years and enough to last for eight or ten years.

I had a quantity of hickory lumber that I intended using for axles but owing to a slight defect in the wood it was unsuitable for axles and so I used this lumber to make the main part of my band saw frame, so it can be seen that it is stout and heavy and equal in practically every respect to an iron casting.

No. 1 is an axle $4 \times 5\frac{1}{2}$ inches and $5\frac{1}{2}$ feet long and I laid it out in such a way as to saw it out in sections to suit a one-inch plank, or in other words, by stepping the timber.

No. 2 and No. 3 are hickory axles and No. 4 is a piece of white oak, 4 by 8 inches, all of which forms the front side of my frame. When I had the bed completed I started on the circular frame to carry the upper wheel. I got three chestnut planks, one inch thick, 12 feet long and 14 inches wide. I got out sections about 15 or 18 inches long as at Nos. 6, 8, 9 and 15 and these gradually tapered to 7 or 8 inches at the wide end. This arched work is built up of planks nailed on to the post, No. 1, a plank being nailed in to the offset on No. 1 and the next overlapping the joint of the first one and so on to completion of the circle, building in at the same time the wood work at 14 to carry my plate that bears the upper wheel, No. 11. There is an iron frame of 2 by $\frac{3}{4}$ inch tire iron on four sides and a threaded hole in the bottom to regulate the tension on the saw with the hand screw at No. 13.

After I had hung my wheels and put on the saw I discovered that the saw would not stay on the wheels and I found the trouble was that the wheels were not accurately lined up and I put in a longer post so as to regulate this as shown by Nos. 18 and 19. The guide at No. 10 has a roller bearing. I drew a center line from the top to the bottom wheel as at No. 12 and then squared my table to it. There are studs at No. 16 to permit setting the wheel forward of backward.



INGENUITY AND A JUNK PILE
PRODUCED THIS

The cast iron plate at No. 11 was cut out of a cog wheel that came out of an old fashioned threshing machine and which had a hole already drilled in it sufficient for my purpose. The upper wheel was the traveling wheel of an old mower and I had a shaft turned to fit the hub of this wheel and the other end turned to suit the hole in the plate at 11.

As I was not equipped with tools for turning iron, I sawed off all the spokes close to the rim of the wheel and put on a wood rim made of plank felloes, the first round of rim with a one-inch notch in the center of the rim piece and let down on top of the ends of the spokes all around and required no other fastening. Then I put on my wheel, put on the belt and started up, put a tool rest between my belt, got a new horse rasp and made the fuzz fly and in this manner I trued up my wheel, which is 30 inches in diameter, and faced them

with an old rubber belt.

My bottom wheel was built into a cast iron wheel, hub and axle that once did duty on an old manure spreader. I used these because the necessary boxing and hubs were there to build into. There was a small wheel also on this shaft, used to unload the spreader with when thrown into gear and I built my driving pulley over this.

My saw is 18 feet long and $\frac{3}{4}$ inches wide. I have sawed all of my tire wood with it for the last ten years and can saw a 14-inch stick.

Wheel No. 13 was once upon a time the flywheel of a sewing machine.

I mend my own saws by filing the edges down to a feather edge and lap for one tooth. pour on a little muriate of zinc and slip a piece of silver solder between. Then I heat a pair of tongs to a good, red heat and clamp the saw and hold it with the tongs until cooled and the job is done, except for possibly a little finishing around the joint.

In making the circle part of the frame, plank No. 15 is left so that it can be removed. It has eight one-half inch bolts that go clear through the frame to hold the same on. The plank at No. 6 shows how the felloe-like pieces of plank were nailed on with 8 penny wire nails at intervals of two inches. The frame at No. 7 is seven inches in each way all around and this makes a frame that has proved as firm and as free from vibration as a tree.

FACTS ABOUT EVERYDAY ALLOYS.

Brass is an alloy of copper and zinc, while bronze is made of tin and copper. The copper and zinc alloy is commonly known as yellow brass. Red brass and white brass are the same only the quantities of copper and zinc are increased respectively in red brass and white brass.

The brass used for castings is generally a composition of copper, zinc, lead and tin and is known to the trade as "steam metal."

Phosphorus added to bronze reduces the melting point of the metal and makes it flow at a comparatively low temperature.

In the final casting of manganese bronze there is practically no manganese present in the metal. The manganese is added to the mixture in order to make a small amount combine with the other materials. In the melting operation the manganese is dissipated.

One of the most treacherous alloys is one composed of aluminum and zinc. An alloy of aluminum and zinc when first cast has high tensile strength but in the course of a short time the alloy will disintegrate and certain parts of the alloy will be reduced to a fine powder.

Lead is the best anti-friction metal but is too soft to be used in resisting heavy pressures, consequently most anti-friction metals, classed generally as Babbitt metal, are composed of copper, tin, lead and antimony.

Carbon in The Cylinder

C. L. WHITE

NEARLY everyone who has had any experience with gasoline engines knows that the chief cause of carbon in the cylinders is an excess of the lubricating oil which is incompletely burned with the explosion of the gasoline gas, thus leaving the carbon on the tops of the pistons and on the cylinder heads. Excess gasoline in the mixture is also responsible for a little carbon which would easily pass out with the exhaust if it was not for the stickiness of the cylinder head and piston top produced by the excess cylinder oil carbon.

There are two main causes for the lubricating oil getting past by the piston. First, an oil of inferior grade (cheap) or of incorrect weight or viscosity will pass the pistons much more easily than one carefully selected to meet the different conditions or nature of the load on the

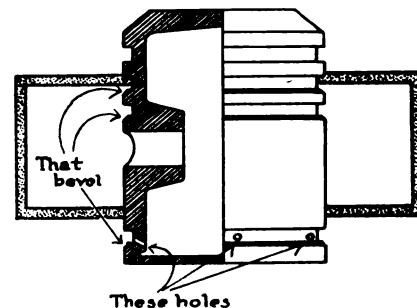
the troubles with carbon, it is necessary to correct the fit of the piston and rings in the cylinders. If a simple condition of wear of the pistons and rings has occurred and no pronounced piston "slaps" are heard, then it is probable that new piston rings will solve the difficulty. Often a single ring placed in the groove of the top ring will prove sufficient. If one of the nationally advertised rings is used it is advisable to get the advice of the maker of the ring as too many (more than two) to a piston will cause the lubricant to be scraped off and cause loss of power, overheating and may be a scored cylinder. In some cases relief has been obtained by the simple expedient of beveling the lower edges of one or more of the ring grooves as shown in figure 1. If this is done one should also drill three or four small holes through the "skirt" of the piston as shown in figure 1.

In case the excess lubricant passing the pistons is due to scored (grooves worn) cylinder walls or pistons and rings worn so badly that "slaps" are noticed; (Slaps are knocking noises not caused by loose bearings in the engine.) it is advisable to have the cylinders re-bored and new pistons and rings fitted.

It will be noted that we have discussed the causes and some of the "constructional" preventions for carbon in the cylinders. There is another method of at least partial prevention that depends for its success on its becoming "habitual" and that is the use of a small amount of kerosene oil (coal oil) put into each cylinder head once a week. It is best to put this in when the engine is hot and at night so that it will have time to soften the carbon. In the morning start the engine as usual. Do not overdo this practice as too much is likely to cause a dilution of the lubricating oil by leakage past the pistons and thus make it necessary to drain the engine oftener than once a month or every thousand miles, which careful and well informed motorists have found to be good for their engines. A teaspoonful or priming cupful is a sufficient quantity for each cylinder.

The use of water drawn in through the carburetor is not recommended as it is first necessary to warm up the engine and then run it at high speed while a considerable quantity of water is slowly passed into the air in-

take pipe. This is expensive in time, gasoline and wear and tear on the engine. Some of the liquid "carbon removers" now on the market are as good as kerosene and a few are better.



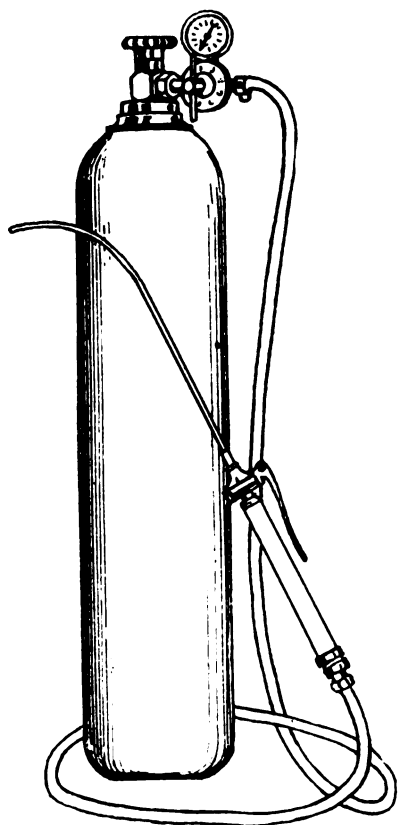
THIS IS HOW AN OIL PUMPING CYLINDER IS CURED IN ONE TREATMENT

Now to get down to the actual removal of carbon from the cylinder the good old fashioned method was to take off the cylinders or the cylinder head and *scrape it out* with a screw driver, cold chisel or special scrapers made for the purpose. On the Ford engine and those having similarly removable heads, this is a quick and sure method,—but on those engines having cylinders and heads in one casting it is best to use the oxygen burning process.

The oxygen burning process requires for equipment; a tank or so-called "cylinder" of oxygen, a regulating valve, a length of rubber tubing, a small valve attached to a ten or twelve-inch length of small, flexible tubing, a supply of long matches, a squirt oil can of common cylinder oil, a couple of sheets of asbestos paper about one by three feet, and a fire extinguisher handy for emergencies.

The procedure for burning out the carbon is as follows:

1. Run engine with gasoline cock at tank closed until all gasoline in carburetor and in dash tanks is exhausted.
2. Remove spark plugs and valve caps (if any).
3. Turn engine over until piston is on top compression stroke, thus being sure that valves are closed. Place asbestos over parts that would be injured by sparks.
4. Open the oxygen valve at the tank and adjust regulator to show 17 to 20 pounds pressure, if indicator is provided to show this.
5. Put the end of the flexible metal tubing into cylinder through valve cap or spark plug, place lighted match in cylinder and turn on oxygen hand valve. The tubing should be directed into all



CARBON BURNING OUTFIT SHOWING THE SPECIAL OXYGEN TORCH. THE LONG, CURVED TUBE IS FLEXIBLE

engine, temperature of operation, and condition of wear or fit of the pistons and bearings, etc. Second, in those cases where a change to a correct lubricant does not remedy

parts of the cylinder and continued until burning ceases. If it is believed that there yet remains a little carbon, a squirt or two of oil from the squirt can will allow the burning to continue and the carbon is thus sure to be all removed. Turn engine to compression stroke for each cylinder as burned.

The garage man obtains a reasonable profit by making a charge for this service of from 35c to 50c per cylinder.

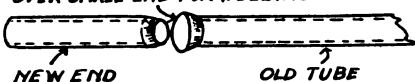
The old worries of the auto owner that the sediment left by this burning process would have an injurious effect on the cylinder walls by causing undue wear, has been entirely dissipated by the good results obtained.

Welding Boiler Tubes

BEST HILLYER

WITH the price of materials on the jump and hard to get at any price many persons and concerns which have never given much consideration to economy are thinking it over and beginning to economize.

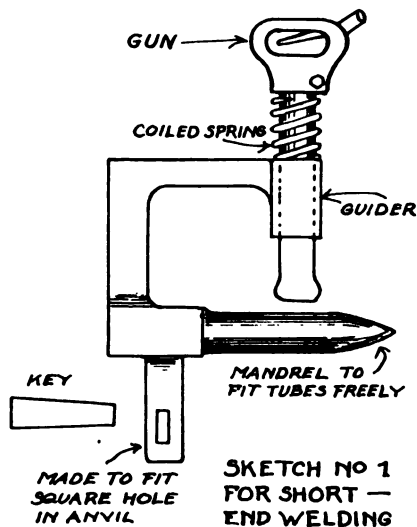
SHOWING SCARF BEFORE BEING CLOSED OVER SMALL END FOR WELDING



One of the ways that a large New Jersey concern is saving money and material is in welding boiler tubes. When the tubes are removed from the boilers it is necessary to cut off the beading with a cold chisel or by other means naturally this ruins the ends of the tubes and leaves them

too short for any further use and in the past these tubes have usually been scrapped.

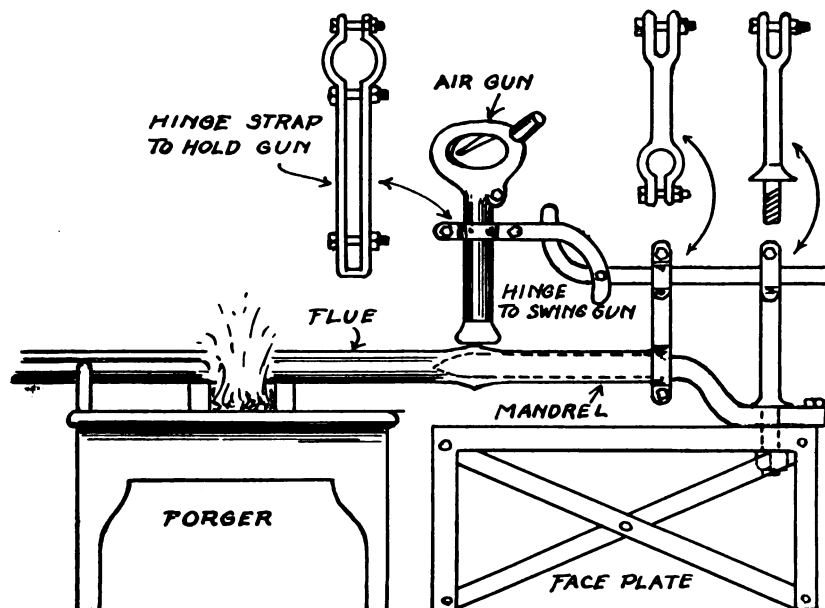
Boiler tubes, as a rule, are made of the very best charcoal iron obtainable, so as to lengthen their life and to obtain the maximum of service before it becomes necessary to install new tubes. This quality of iron, of course, is considerably more expen-



sive than ordinary iron pipe and each time that a tube develops a leak at the beading and has to be removed a considerable expense is incurred.

The tools for welding these tubes were made in the smith shop, with the exception of the air riveter, or "gun," as it is called in shop talk. These tools are of my own design and will make a safe and quick weld.

After welding, the tubes are tested to 265 pounds cold water pressure, or twice the pressure carried in service.



SKETCH NO 2 FOR WELDING LONG PIECES

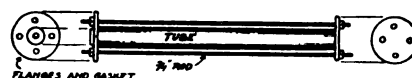
The tubes run from two to three and a half inches in diameter and from five to 18 feet in length.

One reason for writing this article is that heretofore welding boiler tubes has been attended with but little success in the small shops where they attempted to do this work by hand and where it did not pay to install an expensive tube welding machine.

The tools shown can be made by any good smith at very little expense.

The guide that holds the "gun" can be bored out, or a piece of pipe can be welded to the arm by the acetylene welder. It is very important that good, clean welding heats are taken to weld tubes. If this precaution is neglected the best welding machine made could not turn out good work. The best way the writer has found, is to have good, high banks on the sides of the fire so that a fire brick laid on top will be supported by them. This allows the tube to be turned around slowly while heating and there is no danger of any dirt falling down on top of the part to be welded. After welding the tube is swaged to exact size.

The illustrations are sketches of machines designed by me that were made in our shop to meet our individual requirements and to accom-



HOW THE WELDED TUBES ARE TESTED

modate the different sizes and lengths of tubes. Some of these tubes are so long that they are shoved through the fire on the mandrel instead of being taken out as is usually done with the ordinary tube.

Carbon Content and Welding

In taking a welding heat there are many things to consider, such as a clean fire with the coal well charred and all clinkers removed, etc. But upon the carbon content of the steel depends the success of the weld or the reverse, for carbon content is a vital factor in the cohesive properties of the steel. The following table should be of interest to every blacksmith. We give the carbon content of the steel and its physical properties:

1.58	Will not weld
1.38	Will weld
1.12	Welds fairly
0.88 to 0.62	Welds easily
0.62 to 0.38	Welds readily
0.38 to 0.15	Will not temper
0.15 to 0.05	Will not temper

Making Locomotive Wheels Sixty Years Ago

JOHN FULLER, SR.

HOW locomotive drive wheels, six and seven feet in diameter, were forged in the blacksmith shop of the Southeastern Railway works at Ashford, Kent, England, fifty-five years ago and the men who made them will give one an idea of the skill demanded of the blacksmiths of that day.

The writer was privileged from 1855 to 1865 to associate with and witness the work of a few of the most skilful blacksmiths then living in England. At that time there were employed at the Ashford shops between two and three thousand mechanics of various callings to keep up the rolling stock and miscellaneous equipment of what was even at that time, an extensive railway system. The Southeastern also operated a line of passenger steamers from Dover to Calais, from Folkestone to Boulogne and elsewhere, and the mechanical equipment of these vessels was kept in trim at the Ashford plant.

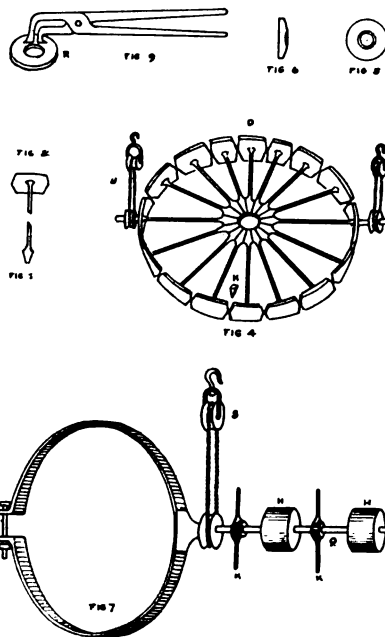
All the locomotives were overhauled here, repaired or rebuilt when necessary and the passenger coaches, freight and cattle cars and coal trucks were all brought to Ashford when repairs could not be made elsewhere. In this way a body of mechanics unexcelled anywhere was gathered together.

In workshops the size of this there is always a big supply of scrap shavings from the lathes, planers and other machines and these were collected daily and taken to the puddling furnaces where they were converted into billets of various lengths and sizes and then bundled together for axles and other purposes as required.

When wheels were wanted the smith took enough of this machine scrap to the puddling furnace and when at the proper heat, rolled it about on the furnace hearth on the end of a suitable bar. Then the metal was taken to a steam hammer and kneaded into a rough billet of approximately the size to make the piece shown in Fig. 1. This operation was repeated until he had enough pieces for a wheel, in this case twenty-one. The face of the anvil was then changed for a die the exact shape of Fig. 1 and each billet then was forged to its proper shape. One end of these pieces formed the nave or hub of the wheel as shown in Fig. 4. Next the same

number of pieces, Fig. 2, were made in a similar way in a die to form the felloe and then the two pieces, Figs. 1 and 2, were welded together at the break and formed the completed spoke and a portion of the felloe.

The spokes were then laid in position, Fig. 4, and a clamp, Fig. 7, is placed around them, of sufficient strength to hold them securely by tightening the bolt at E. The clamp had a long, square handle, O, O, on



THERE HAVE BEEN SOME IMPROVEMENTS IN THE MANUFACTURE OF LOCOMOTIVE WHEELS SINCE 1855 BUT NOTHING HAS EQUALLED THE SKILL OF THE MEN WHO MADE THEM

which two balance weights, H, H, slide and of sufficient weight to counterbalance the wheel and clamp. There were also two cross handles, K, K, secured on the handle so that the wheel could be easily turned over by two men when the whole affair was hung by a chain pulley and suspended from a swinging crane.

When the wheel was thus prepared and balanced it was ready for the forge. Two washers, Figs. 5 and 6, were then prepared to fit the concave made by the ends of the spokes which formed the hub, one for each side of the wheel and of the proper thickness and diameter.

The face of the anvil for the welding of the first washer was convex to fit the hollow of the spoke ends when the washer was being placed on them under the hammer. Then the face of the anvil was changed for a level one for the other side. The washers, Figs. 5 and 6, were heated in the puddling furnace while the nave, or

hub, was being brought to welding heat in the forge. When all was ready the smith and his helpers would flop the wheel over, by the handles on the clamp, and shove it under the hammer as quickly as possible while two others took the washers from the furnace with tongs made as shown in Fig. 9 and with another crane swing it to and place it into position on the nave of the wheel and then with two or three blows of the hammer complete the welding. The convex face of the anvil was then changed and the operation repeated to weld the washer on the other side of the nave.

The forge was made of boiler plate about four feet in diameter and two and a half feet high and filled with fire brick, having a fire box large enough and deep enough so that the nave of the wheel could be brought to a welding heat. The blast was fed by three blast pipes.

The next operation was to complete the rim of the wheel, that is, to weld all the parts of the felloes together. The wheel was then taken to an ordinary smith's forge and a fire prepared to suit the work as follows: A round iron bar, about an inch in diameter, was made red hot and the end placed in the tuyere and then some fine, wet coal was formed around it about ten inches square and reaching from the tuyere for about two feet. A pipe was thus formed for the blast by the coal caking around the hot iron rod through the square formed with the fine coal.

The wheel was then slung in a crane so as to nicely balance on two chains and pulleys as shown in Fig. 4, one on each side of the wheel. This operation required three men, two smiths and a helper, one smith at the wheel and one to make the wedge piece, H, to fit the opening between the felloe sections and then get it to a welding heat by the time the wheel was ready; then the wheel-smith and helper flopped the wheel over on the anvil and these two hammered the wedge into place as quickly as possible. After this wedge was put in on the other side and while it was yet red hot, the two smiths, one on each side, with a float or rasp about three or four feet long, rasped the edge between the spokes to make the wedge conform to the shape of the felloe as it came from the hammer die.

When the felloes were all welded together and the smiths' work was completed the wheel was placed in a lathe and the hub and rim finished to receive the axle and tire.

Horse Snowshoe Used in Primitive Travel

ALBERT MARPLE

THERE are still a few old settlers in the western part of this country who will remember the horse snowshoe which was invented for use in drawing passenger and freight stages through the snow-clad mountains of Northern California in the early days—long before the advent of the railroad, when methods of travel were in a primitive state. There are however, very few people living who really saw these snowshoes in action, for their use was confined to the "run" between Sierra Valley, Sierra county, California, to Truckee, on the shores of Lake Tahoe.

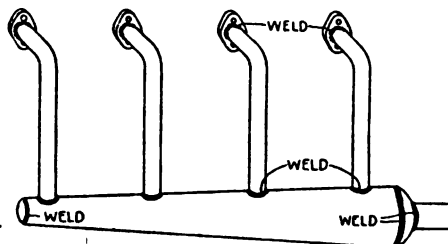
This snowshoe is not long and narrow like the ski, but its broad, square flat surface is built on the lines of snowshoes used by man, but being very much heavier. The regular horse-shoe was nailed in the ordinary manner to the horse's hoof. When it was desired to attach the snowshoe the regular shoe was placed in especially prepared holes in the metal base of the snowshoe. This metal base is about twelve inches square and a quarter of an inch in thickness, and is in turn securely fastened to a flat piece of leather, 15 by 18 inches in size, which came in direct contact with the snow. In order that the nails of the regular shoe might not carry all of the strain of the weight and pull off the snowshoe, a screw

clamp was provided which fit tightly over the top of the horse's hoof and held the snowshoe rigidly in place.

The horses which were used on this run were trained to stop instantly if the shoes, which were generally worn on all four feet, became loosened. These shoes proved especially valuable when the drifts ran from eight to twelve feet in depth, for they often kept the animals from becoming engulfed in this high Sierra snow. They made possible trips which, without them, would have been held up for days and even weeks.

Constructing Parts With the Blow Torch

When building so-called "racer" bodies, remodeling old cars or repairing good ones, converting pleasure cars into trucks and in a number of other cases the oxy-acetylene torch



AN EXAMPLE OF ACETYLENE WELDED SPECIAL PARTS

comes in strong and can frequently be employed in the construction of parts for individual cars that would be impossible to obtain in any other manner.

The illustration is an example of this sort of work which is an exhaust manifold for a racer. The flanges that bolt to the cylinders are steel welded to the bent tubing or pipes, which are welded to the manifold made of 8 or 10 gauge sheet metal, rolled up and welded as shown.

A few other applications of the welding apparatus that make life worth living to the mechanic are round or oval gasoline tanks, control levers may be lengthened, shortened or offset, pedals can be made longer or shorter, making seats, steps, irons for canvas guards, welding cross members to the frame to reinforce and eliminate the loosening of rivets, reinforcing the rear of the frame to permit the safe use of trailers, exhaust radiators to keep the occupants of the car comfortable in cold weather, exhaust manifolds with water or air jackets and any number of other things that the shop man is often called upon to make.

Carburetion is Important on Kerosene Engines

ADJUSTMENT of the carburetor, vaporizer, or whatever it is called, on kerosene burning tractor and other engines using this fuel is of the utmost importance and demands more thought than the average operator usually gives to it.

Kerosene does not reach the combustion chamber of the engine in the same gaseous and highly explosive condition that gasoline does; the kerosene coming into the cylinders more like a very fine mist, although more or less of the kerosene is in a gaseous form.

On all kerosene burning engines gasoline must be used to start up with and in many cases after the engine has been switched from gasoline to kerosene the carburetor adjustment is not attended to. The carburetor adjustment may not need attention but at the same time it is well to see that no more kerosene will be admitted to the cylinders than will operate the engine efficiently.

If too much kerosene is admitted to the combustion chamber it will not be entirely consumed and will ultimately work its way down into the oil base of the engine and what kerosene oil does to the lubricating oil is a good and plenty.

A tractor operator took a look at his oil gauge and saw that he had about an inch and half more oil in his engine than could reasonably be expected after the engine had been in operation for the period it had been. Investigation revealed the fact that the oil in the crank case was nothing but dirty kerosene and possessing little or no lubricating qualities. What the result to the engine cylinders would have been if the engine had continued to operate for any considerable period on this kind of lubrication is easy to imagine.

This trouble with kerosene in the crank case will naturally only be encountered in tractor engines of the vertical type, the horizontally placed engines being free from this complaint. However, the lubricating of the horizontal engine presents more of a problem than the vertical engine.

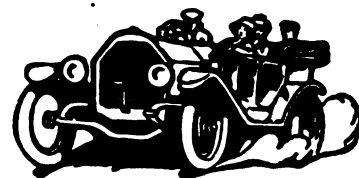
No rule can be laid down for regulating the kerosene carburetor, as some will operate equally well on either gasoline or kerosene without adjustment while others will—they do sometimes, but this matter of getting kerosene into the oil is an uncommon rather than a common occurrence but one deserving to be kept in the mind of the repairman.



A HORSE WITH A SET OF THESE SNOW SHOES OUGHT TO COVER THE GROUND THOROUGHLY

Getting Ready For That Spring Drive

UNCLE "JIMINY CRICKETTS"



I WAS talkin' with Jabez Slocum the other day. Don't know "Jabe?" Well that's funny, thot everybody 'round these parts knew him. He's that fore-hand-ed feller that lives down to the "Forks." Someway seems to always know just what's goin' to happen. Leastways he seems ter always be ready for all the opportunities that come along.

But as I was saying "Jabe" and me wus talking to-gether about this awful cold snap we been having when he says, "Well, Uncle, are you getting ready for the spring drive?"

And I says, "What spring drive do you refer to? The only drive I been hearing about is the one the Huns are expected to spring on our boys pretty soon."

"That ain't the one I mean," says Jabe. "I mean one that's a darn sight nearer than Verdant, or whatever the name is of that French place. I refer to that drive you'll soon be taking on that tractor you got last season."

Now my constitution is so regulated that I get riled up real easy and if it had been anybody else than Jabe I'd probably said something real stiff and cutting, 'cause I don't like folks to sling incinerations at me. You see some folks in these parts have been known to cast reflections on the way I put up my machines for the winter. Claim I let rain and snow get on them. But how can I help it if roofs do get leaks and windows will get broke out too, you know. Besides, what harm does a little clean water do anyway. Of course some said that it was my own fault that it cost me the sum of fifteen dollars and seventy-eight cents to get the magneter fixed on my Overland spring 'fore last.

But to get back to that talk with Jabe. When he spoke about my tractor I said, "Don't you think its pretty early to begin to think about that?"

But Jabe kept right on with his idee. Jabe sure is a far-seer for one so young. Ain't turned thirty yet, if Aunt Sadie Coombs'es figgers are right, and she usually is pretty near correct, especially when it concerns them of the marryin' age. Jabe ain't married yet. Not for want of a chance tho', Aunt Sadie says.

Says Jabe, "The railroads are in pretty bad shape and if I remember right, the last time I was over to your place in the fall we noticed that the casting that holds the water pump had begun to show a crack and you said she didn't have the pull she showed in the summer."

"You're right, Jabe," says I. "Guess I'd better order that casting pretty soon. But about the power, how do you account for that?"

Now we in these parts have been getting considerable confidence in Jabe's ability around autos, tractors, trucks and such. Especially since he took that course of schooling in engines two winters ago at the Y. M. C. A. up to the city. He not only seems to know all the technical names and speaks them right out quick, but he's taken apart nearly every machine hereabouts and gets them back together and they run slicker'n grease, too.

"Well about the power question," says Jabe, scratching his head where he's getting bald. A habit he has when he's thinking and pondering a real problem. "I believe its due to leaking valves. You see you haven't used her enough to get the pistons worn much, nor the rings either."

"Guess you're right, Jabe my boy. When can I get yer to come over and fix her up?"

And right here Jabe sprung a surprise on me that I ain't had time to get over since. He pulls a little black note book out of his vest pocket and reads over in a sort of whisper like, "Let's see, Si Greenleaf's Ford engine, Joe Perkin's tractor rear end, magneto for that Paine fellow on the East road,——" And he went over at least eight different jobs he had on the list. And then he says, "Well, Uncle Jiminy, it looks to me like it would be about the first of May before I can get to you. First come, first served. You know," says he.

Maybe I showed my surprise on my face because he says, "You see I'm going to be short on it for help this year because all the young fellers are gone and besides there seems to be more work than ever now."

And right here I feel real bad for Jabe because I know how bad he wanted to help out Uncle Sam but couldn't on account of that old sick

mother of his and he the only child left to take care of her too.

"Now, Jabe," says I, "You just do your best as you have always done. I'll order that casting tomorrow and have it ready when you can get to it."

And then just as we were leaving each other Jabe sort of nudged me in the ribs and said playful like, "Say, Uncle, won't you clean her up a bit with some coal oil and an old paint brush and have the tool box dug out too, before I come over. It'll help a lot," he adds.

And I says, "I'll have it done, Jabe, I'll have it done."

And going home after I couldn't help but admit that Jabe was the kind of feller that needed encouraging. I'd have that tractor cleaned up too. Yes, siree I would do it myself too,—if necessary.

Battery Apron

Everyone who has worked around storage batteries knows the destructive action of the electrolyte on clothing, and no matter how much care is taken, the workman usually gets more or less of the corrosive fluid on his clothing.



STORAGE BATTERY SOLUTION IS ROUGH ON CLOTHES BUT A FEW PIECES OF OLD TUBES MAKE AN ACID PROOF APRON

An old inner tube or two slit and cut into convenient lengths and either sewed, cemented or vulcanized together to form an apron, as shown in the illustration, will protect the clothing against even the pure acid.

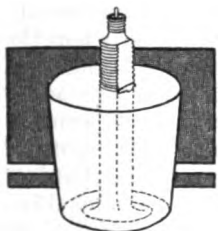
Repairing Radiator Leaks

J. S. HAGANS

AFTER the car owner has used a lot of putty and glue, stuffed his radiator full of dope to stop leaks that don't stop, he usually gives it up for a bad job and either brings the car or the radiator to the repairman to have it patched up.

On the face of it repairing a leaky radiator looks like a serious matter and it is a job that requires considerable skill and calls for the exercise of some judgment on the part of the repairman.

The best way to go about the work is to remove the radiator from the car as it is much easier to work on, particularly if there is a large number of small leaks or a large one.



AN OLD TIRE VALVE AND A CORK HELP IN LOCATING RADIATOR LEAKS

A wooden tray big enough to accommodate the radiator and eight or ten inches deep should be provided and filled with water. Both of the openings in the radiator should be sealed with large corks, or if they are not obtainable wooden plugs will answer. It is best to have one plug into which has been inserted an old tire valve as shown in the drawing. Attach the valve to a tire pump and then place the radiator in the water tank and a few strokes of the pump will disclose the location of the leaks by the bubbles that rise. The leaks are then marked and the radiator removed and soldered, the operation being repeated after soldering to ascertain whether the leak has been completely sealed.

After all the leaks have been located and soldered any superfluous solder can be dressed off with a fine file and the job is complete.

The ideal way to repair a leaky radiator is to dip the whole thing in a liquid flux, such as zinc muriate, and then dip the radiator into a bath of melted half and half solder. This is the way all radiators of the cellular type are soldered at the factory. Most manufacturers are now making radiators with a removable shell that can be removed so that the finish will not be marred by this process.

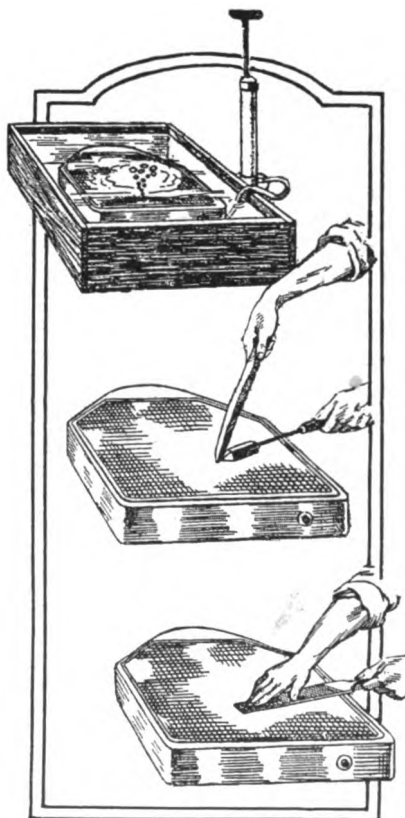
It is almost impossible to solder a leak in a cellular radiator, if the leak is located deep in the radiator, un-

less a very small soldering iron is used and then the operator must be very careful that he does not start more leaks than he is trying to repair. With radiators of this type some repairmen close up the openings of the cell or cells on both sides of the radiator but of course this does not make a very neat appearing job. Another method that can be used is to flux the leaky cells thoroughly and then pour the melted solder over and then finish off as needed with a fine file. Care must be exercised in doing this, however, to avoid starting more leaks.

In radiators of the Ford type where tubes are employed it is sometimes possible to make repairs on a leaky or jammed tube by cutting the tube about an inch above and an inch below the damaged part and then putting on a sleeve, soldering the sleeve in place. This will apply to other radiators of similar type but if the radiator is badly broken it will probably be economy to buy a new radiator.

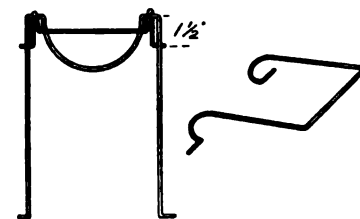
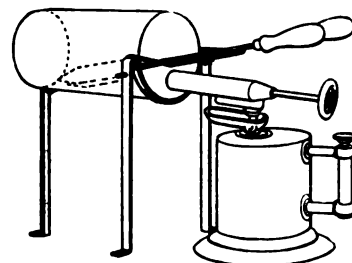
The repairman will perhaps find that a few specially made soldering irons will help him in his work and he can easily make these himself and individual experience will indicate just what is needed in this respect.

A furnace for heating the soldir-



FIRST LOCATE YOUR LEAK, THEN SOLDER AND FINISH

ing irons will be necessary and as this is equipment that is lacking in a great many shops a suitable and entirely satisfactory furnace can be made with little trouble that can be set up in front of the gasoline blow torch that is found in almost every



A HANDY SOLDERING IRON FURNACE CAN BE MADE FROM A FEW STRAY BITS OF METAL

repair shop. The furnace is very plainly shown in the drawing and can be made to suit the individual requirements of the mechanic, the only materials needed being a piece of iron pipe to suit the sizes of soldering irons used, some pieces of strap iron, two or three rivets and a piece of heavy wire to form the rest.

How to Repair a Bent Headlight Rim

Here is a novel method of repairing a bent headlight rim, if it is of nickel. Remove the rim from the other headlight and pour molten babbitt into the hollow portion of it. This will not injure the nickel finish. After removing the hardened babbitt, place it in the damaged rim and with a small hammer and light taps force the rim to assume the shape of the babbitt.

Substitute for Borax

The following mixture is claimed to weld steel at a lower temperature than is required with borax; Cop-peras, 2 ounces; common salt, 6 ounces; saltpetre 1 ounce; black oxide manganese, 1 ounce; prussiate of potash, 1 ounce. Pulverize the whole and thoroughly mix with three pounds good welding sand.

The Springs of The Car—I

F. M. PAULL

Automobile springs are manufactured in many ways and according to many different standards of excellence. However, if automobile springs are to fulfil the requirements of satisfactory service under abnormal as well as normal conditions, they can be manufactured according to only one standard and that is the highest commercially possible, and what is "commercially possible" depends solely upon the equipment, knowledge and skill of the manufacturer.

There is no part of the automobile that requires more accurate machine work and workmanship than a properly lubricated spring. The accurate determination of dimensions by the designer is of little use unless the workmen carry out his orders implicitly. Especially do the thickness and taper of the leaves and the fitting of one leaf against the other, require the greatest care and skill, and all these operations vitally affect the later performance of the spring and in particular, its smoothness of action.

The selection of the proper steel and its subsequent heat treatment and manipulation are most important factors in the production of a satisfactory spring. Spring steels are usually known as alloy steels because it has been definitely ascertained that simple high carbon steel does not make either a satisfactory or durable spring.

When some element or group of elements other than carbon is emphasized in the composition of steel to a point where it noticeably affects the properties, the steel becomes known as "alloy steel," and is denoted by the name of the chief alloying element or elements. For instance nickel-steel, silicon-steel, vanadium-steel, silico-manganese-steel, nickel-chrome-steel, etc.

The impurities that affect the quality and strength of steels are mainly oxygen, sulphur and phosphorus and these three elements are particularly harmful, if present in steels to be used in automobile spring manufacture.

Commonest of the alloying agents employed in the manufacture of high grade spring steel are silicon, titanium, nickel, chromium and vanadium and, needless to say, these alloy steels require entirely different manipulation and heat treatment than that required for high carbon steel.

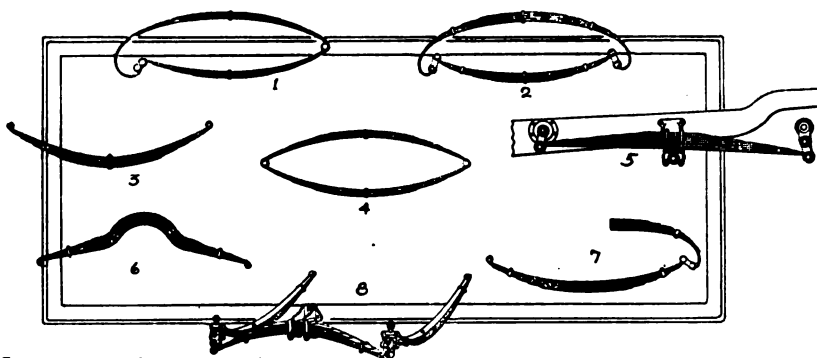
Silicon takes up the gases, thus reducing "blow holes" that are caused by the presence of oxygen and therefore increasing the soundness of the metal. Silicon also increases the hardness without a proportional increase in brittleness. A certain percentage of silicon will in-

crease the tensile strength and elastic limit, and therefore it can be used advantageously in spring steel.

Vanadium is one of the most effective scavengers and when combined with nickel or chromium it produces truly remarkable results, because we get all the beneficial elements without the flaws and uncertain weakness of "blow-holes," which otherwise practically annul their valuable contributions.

Sharpening a Lawn Mower

A man has to be an expert to sharpen a lawn mower properly. A mower should wear evenly in running when the cutter bar and reel blade are constantly in perfect contact with one another. This often requires expert machine grinding. Fully 90 per cent. of complaints that lawn mowers don't cut is because the reel is loose on its bearings, or if the reel is not loose the reel knife and cutter bar knife are not properly adjusted to each other or the knife is dull. The reel may be out of round. This may be due to improper filing. If the reel is only a little out, and is not nicked or out of shape by hitting stones, the cutter bar should be adjusted to the highest blade so that it will have cutting contact.



Courtesy Detroit Steel Products Co.

THE SPRINGS OF THE CAR ARE SHOWN ABOVE

1—Single Scroll Elliptic. 2—Double Scroll Elliptic. 3—Semi-Elliptic. 4—Full Elliptic. 5—Cantilever. 6—Cross Spring, Ford Model T. 7—Three-quarter Elliptic. 8—Platform Spring.

crease the tensile strength and elastic limit, and therefore it can be used advantageously in spring steel.

Titanium is a gas scavenger and in this respect behaves somewhat like silicon. Titanium usually goes almost entirely into the slag of the furnace and so does not show up very much in the chemical analysis of the steel.

Nickel is used in widely varying proportions and the effects produced vary in the most remarkable manner with the proportions. In general, for moderate quantities of nickel the effect is to greatly improve the grain, thus increasing the tensile strength and the elastic limit. It also increases the hardness and soundness, and in certain proportions produces a steel that is particularly well adapted to withstand shock and vibrating loads. Varying proportions of nickel have most remarkable effects upon the critical temperatures of steel. Used alone, nickel has a tendency to prevent blow holes from welding together under the hammer.

Chromium in steel raises the critical temperature and retards the rate of change of the structure upon



**Victory is a
Question of Stamina
Send—the Wheat
Meat·Fats·Sugar
The Fuel for Fighters**
UNITED STATES FOOD ADMINISTRATION

Don't Run Acetylene Cylinders too Low

A QUESTION often asked by users of dissolved acetylene is "how much gas should be taken from a cylinder?" The question is one of safety, economy, efficiency and perhaps expediency says The Welding Engineer. It is *particularly important at this time*, inasmuch as the government has use for all the solvent that can be made or saved.

Is it safe to withdraw acetylene from the cylinders when the pressure is lowered so far that the solvent is withdrawn? An acetylene cylinder represents not only a steel drum, a cylinder valve and a porous filling, but also a definite amount of solvent, usually acetone, required in order that a proportionate volume of acetylene may be safely charged into the cylinder. This amount of solvent, is of course, checked up and the deficiency made up when the cylinders are recharged, but the procedure is not automatic; the human element has to be taken into consideration, regardless of the strictest control. Fortunately the large companies marketing dissolved acetylene have left nothing undone for the safe use and handling of the product but that fact does not license the user to purposely and knowingly deplete the charge of solvent and thereby establish a condition which may result in danger.

The question of economy is, of course, of interest to the user. It is self evident that every ounce of solvent lost from the cylinders must be added to the cost of production of dissolved acetylene.

It used to be a source of much annoyance when the gas manufacturers made it a practice to charge the acetone loss directly to the customers. While this practice was discontinued some years ago, it could not be expected that the manufacturers would take the loss and, of course the user pays for it now. At the present price for acetone extra cost is, no doubt, a very large cost item. Furthermore acetylene is considerably cheaper than acetone and far more effective as a fuel gas for welding.

The oxy-acetylene-acetone flame, which is the result when using the gas from a nearly empty acetylene cylinder, has practically the same appearance as the proper oxy-acetylene flame, the white cone is in fact longer but the heat value of the flame is much lower. This means of course,

that the time loss and the consequent proportionate loss of oxygen more than outweighs any saving of fuel gas which could be accomplished by the improper use of the solvent. Not only does it take a much longer time to weld with the oxy-acetylene-acetone flame, but the flame is positively injurious, at least, to molten steel, a fact easily proved by comparison.

Loss of acetone occurs when the flow of acetylene from a cylinder is too rapid. The manufacturers of the gas recommend that only one seventh of the capacity be drawn per hour, or in other words that not more than 14 cubic feet per hour be used from a 100 cubic foot cylinder. If more than the above stated volumes are required, two or more cylinders should be connected up by special connections. This does not, however, mean that large manifolds and pipe lines are permitted, as that would lead to the storing of considerable quantities of free acetylene under high pressure which is a hazardous experiment and may prove disastrous. Acetone is also withdrawn rapidly from the cylinders if gas is used when the cylinder pressure is low. One manufacturer states that excessive acetone loss takes place when the pressure is about or below ten pounds and advises that no gas should be withdrawn when the pressure has reached that low level. He also states that the volume of gas the customer pays for is over and above the amount held in the cylinder at that pressure.

At present the demand for dissolved acetylene exceeds the supply. Owing to the shortage of acetone, it may become necessary to penalize the waste of this valuable material.

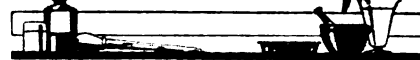
If wasting the solvent is neither safe, economical nor efficient, why waste it?

When in the Mud.

It is a natural impulse when the car stalls in soft going to jam down the accelerator to get all possible power from the motor. But if the car has stalled because the rear wheels cannot take hold in soft mud and are slipping around, this is not the best way out. The whirling wheels simply dig down deeper. It is better, after shifting into low, to let the motor run at comparatively low speed and edge the clutch in gently. This will give the rear wheels a better chance to take hold. Often one can get out better under these conditions if there is a load in the rear seat.

If the wheels continue to slip at slow speed, it becomes necessary to tie ropes about the rear wheels or to throw straw or brush under them. With a light car one can often help it forward by placing one end of a stout plank or pole under the rear axle and with the leverage thus gained lift it forward while another applies the power slowly.—Milestones.

Benton's Recipes



Lacquering Brass—Properly lacquered brass lends a most pleasing appearance to any finished instrument. I have found through experience that if the lacquer is not properly applied, in time it becomes dark and chips off. This is very discouraging, for it necessitates sandpapering off the old lacquer and applying new lacquer, which will not last any longer than the first coat. All this trouble can be avoided in the first place if the lacquer is properly applied. Below is my hard-earned experience in this line.

First, the brass must be given a fine polish. While there are several ways of producing a suitable polish, I find the following very simple:

To begin with, cut from some close-grained wood a circle about ten inches in diameter. Through the center put a $\frac{3}{4}$ x 5 inch bolt. Next, heat some carpenter's glue and apply a thin, even coat to the surface of the wood. Sprinkle some very fine carborundum dust on this and stand away to dry. After the coating is dry place the circle in the chuck of a lathe and, with the lathe running at high speed, hold a piece of steel against the wheel until the surface becomes quite smooth. After this, the brass may be polished without producing deep scratches in the surface. Round pieces of brass may be polished in the lathe by holding a piece of fine carborundum cloth tightly around it. After the brass is polished, avoid touching it with the fingers, as it leaves greasy spots. Next, place the brass in a clean iron vessel and heat gently. The lacquer is then applied in a thin, even coat with a camel-hair brush and the work set away in a dustless place to dry. The brass is heated for the purpose of expelling all moisture.

Finishing Turned Work—Turned brass-work can be finished smooth and true in a similar way, being turned a shade larger than the hole in the die. A number of pieces can be made alike in this manner, the good finish and more accurate work being worth the trouble spent on making the die. Mandrels and dies should be lubricated with thick oil or grease mixed with blacklead.

To Anneal Zinc—In working zinc the greatest loss is on account of the zinc cracking and being too brittle to handle to advantage. It is surprising to find how very few mechanics understand the annealing or malleabilizing of same. The following will be found unailing: Heat in oil to about 500 degrees F. and plunge in hot soda water, which works the double operation of drawing the zinc to the proper degree and at the same time cleanses the surface from the oil.

Drilling Brass—When using a twist drill on brass, grind off the lip slightly on the cutting edges, leaving them parallel to the axis of the drill. The drill will then have no tendency to catch in the work when the point is through.

Radiator Leaks.

One cause of leaks in the radiator is that the vents in the filling caps and overflows become choked, with the result that steam accumulates in the radiator and the pressure, seeking an outlet, forces an opening at the weakest point. A little attention to the vent will remove the cause of the trouble.

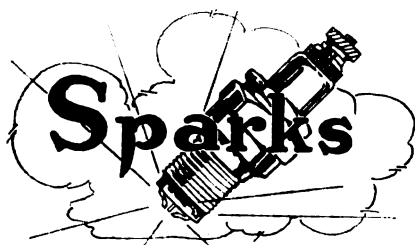
The Tractor

The tractor on the farm arose
Before the dawn at four;
It drove up cows and washed the clothes,
And finished up every chore.
Then forth it went, into the field,
Just at the break of day;
It reaped and threshed the golden yield,
And hauled it all away.

It plowed the field that afternoon,
And when the job was through,
It hummed a pleasant little tune,
And churned the butter, too.
And pumped the water for the stock,
And ground a crib of corn,
And hauled the baby round the block
To still its cries forlorn.

Thus ran the busy hours away,
By many a labor blest;
And, yet, when fell the twilight gray
The tractor had no rest.
For, while the farmer, peaceful-eyed,
Read by the tungsten's glow
The patient tractor stood outside,
And ran the dynamo.

—George Fitch.



Be fair. Even the rounder wants a square deal.

The disgrace of being offered a bribe seems to depend on the smallness thereof.

Patriotism is a curious thing. It's easy to sing "Over There" over here.

Natural history teaches us that the leopard cannot change his spots but the flea is more active.

The boaster should bear in mind that even the locomotive, for all its puffing and blowing, has to take water.

It's all right to conserve the wheat but that's no reason why a fellow should drink more than his share of rye.

The higher life seems to have little in common with the high cost of living.

In spite of the war the telephone continues to be the thing most talked over.

It costs little effort to make some people happy. All you have to do is envy them.

Even when a man feels that he can no longer count on his friends he can continue to count on his fingers.

Man's greatest illusion is to think he has none.

You never can tell, even the junk dealer may be a man of mettle.

Where one person is satisfied to tell the truth another wants to stretch it.

Haste makes waste. The man who takes time by the forelock should also be prepared to take the consequences.

The self-made man doesn't always make himself pleasant.

Any time a man strains at a gnat and swallows a camel you will find that it is some other fellow's gnat and his own camel.

Don't borrow trouble, it's a much better plan to get used to your own.

The saddest words of tongue or pen are these—"no insurance was carried."

The theory that it's never too late to mend becomes a religion to those who lack preparedness.

You can drive a horse to water but an automobile with an empty radiator is different—keep 'er filled up.

How long has it been since the cheering sunlight shone through those dust covered windows and how many years have the old bills and posters advertising the Thanksgiving turkey raffles been on the walls of your shop?

A whole-soled kick always accomplishes more than a half-hearted one.

Time to get ready for this summer's war garden now. The good things you can raise with little trouble and practically no expense are worth the time and—Food will win the war!

The secret of success in business lies in your ability to turn over your stock, not the amount of stock that you can buy.

Charge for this Item—In charging for any job, recollect that time on dirty jobs, such as automobiles, wagons, mowers and all jobs that have grease, dirt, etc., commences when you go to work and should be charged for until the tools are cleaned and your hands cleaned to give you a chance to make change.

Another "Inventor" Finds Substitute for "Gas"

Out of Fargo, N. D., comes the yarn that Henry Lohse, a 19-year-old youth of Park River, N. D., is the inventor of a motor which burns nothing but air, weighs twenty pounds and develops three-quarters of a horsepower.

Lohse started in the inventing business early, for according to the statement, he has been working on this motor for the last five years and says that in a recent "endurance test" the motor ran for two weeks before he stopped it, during which time the motor consumed no other fuel than ordinary air.

At the Seventh Annual Convention of blacksmiths and woodworkers held recently in Winnipeg, Canada, the record of proceedings contained the following extract:—

"Auto and Tractor Repair—This point came up for discussion, and was considered most important, now that so much of this was being handled by blacksmiths. Brother Goodwin, Brookdale, stated that he based his charges as high as the garages and found the line very profitable, although it was necessary to have a good outfit of tools, and in many cases a lathe was a great help in this line of work. With proper prices the blacksmith could make good profits from auto and tractor trade."

The things that one can learn by proper use of his spare time are simply astonishing. If one has a fixed purpose steadily in mind and devotes all the time he can to prepare for it, even though it is only a few moments every day, the results will be very gratifying. Surprising as it may seem, the best results are usually obtained by the busiest people, because such people know the value of time and know how to use it to good advantage.

Good Light Necessary—In the shop we cannot expect to do good work unless we have plenty of light. Small, dirty windows are not only unhealthy, but they are a means of losing light and making the smith continually grope in semi-darkness. Light and lots of it makes for health. It also helps to obviate accidents and tends to accuracy in the job being performed. A man whose eyes are already strained by looking in the glowing fire cannot measure with any degree of accuracy if he has to work in a gloomy and ill-lit shop.

PROVERBS OF SOLUMN

BLESSED is the smith who singeth at his work and worries not at the slowness of the hands of the clock. For contentment dwelleth with him forever and quitting time stealeth upon him unawares.

Harken not to the voice of him whose mouth spilleth flattery like oil from a spout. Verily, he hath an axe to grind.

He that walketh carelessly behind a spike-eared mule lacketh understanding. Verily, he courteth a sudden jar.

Will Bishop.

Cheer up, Brother—So you feel that you're a failure because you don't measure up to your own standards every day in the week? Buck up, Brother! that's the way all good, go-ahead men feel some times!

If they weren't satisfied with their performances as well as their promises, they'd be trotting around in a circle; and that means business dry-rot if anyone should ask you.

A certain amount of self dissatisfaction is the best tonic in the world for a man—just like David Harum's flea-bitten dog. As long as you can find fault with yourself and your works you're alive.

When you get to the point where you feel sorry for the other man because they aren't as good mechanics as you, then is the time for the doctor to put you on a diet and prescribe perfect quiet to keep you from going crazy about yourself!

BUSINESS SLACKERS

The word, "slacker" has come into general use suddenly. You hear it everywhere but the business slacker has been with us always and he is a menace to any business. He demoralizes everyone he comes in contact with. He won't work and he won't let any one else work, if he can help it.

He twaddles away his time and encourages others to do the same thing. Slacker is another way of saying loafer. They are synonymous terms.

There is no room for the business slacker today. The world hasn't space for him. He isn't wanted.

These days demand the best that's in us and it needs all our time to accomplish the best. Every hour is important and not one should be lost for wasted hours are gone forever.

The world has never had much use for the slacker and will have less use from now on. The business pace in this country is going to be so fast for so many years to come that the slacker isn't going to have a chance anywhere.

We are living in the most interesting period of the world's history and opportunities are greater than they ever were before and our motto shouldn't be "watch and wait" but "work and act."

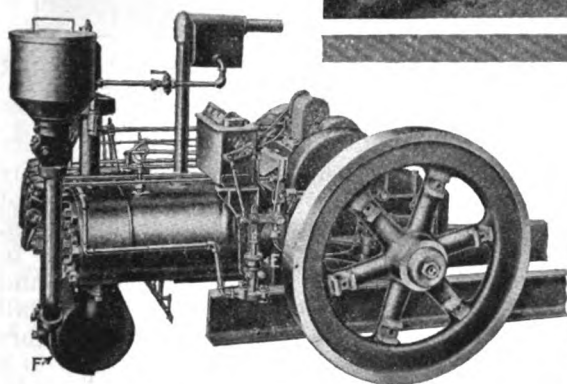
HOHENRAKES MOBILIZE AGAINST HOHENZOLLERNS!

More than ever will war gardens help win the war this year. Every ounce of food added to the world supply is vitally needed.

And finally Remember the Wheatless day and keep it wholly.

Intensive Training For Tractor Operators

CLASS IN BRAZING,
WELDING AND CUT-
TING—LEARNING BY
DOING



POWER PLANT OF TITAN 10-20 TRACTOR
FIELD PRACTICE WITH TITAN TRACTOR AND
THREE GANG PLOW



*Courtesy Mich.
State Auto School*

"Specialists" in professional life, —doctors, lawyers, etc.,—would not think of taking up their life work without a particular education along the lines of the work they intend to follow. Men in trade and business, on the contrary, have jumped boldly or blindly into their work with no advance knowledge of how to handle their problems,—expecting to learn as they go. Of late years the value of training has become more and more apparent. Business men now take courses in "Commerce," "Banking," "Office Management," and allied subjects. Fathers now send their sons to the agricultural college for special training in farm management, and to the automobile school to learn machinery; the boys come home and repay the cost of this training in short time by their efficiency which increases crop yields. Factory mechanics, shop men, all are awakening to the necessity of a trade school education, if they are not to be outdistanced by more far-sighted

men who do invest a few months and a few dollars in specialized self-improvement.

Blacksmith and auto repair shops are extending their activities to the field of the tractor. As every farmer has come to see the need of a car, he will see even more vitally, the need of a tractor. This will require service facilities in every town, large or small, and no one is better fitted than the established blacksmith to take over this new work.

Don't go at it blindly. Compared to a watch, the tractor might not be called a delicate piece of machinery. Still it can be easily put out of kilter by a man who doesn't know his business. How much better to go to a school for a few weeks, learn the principles of construction of the modern tractor thoroughly.

One of the valuable features of such a course is actual field practice, wherein the shop man will gain

first hand knowledge of the farmer's problems. Tractors are assembled completely,—block test work and repair work in the shop are taught by actual practice.

Lectures on gas engines, and magnetos, and practical work on electrical systems and motors of all kinds, are other valuable points. In fact, the combined auto and tractor course is a liberal education for any man, be he mechanic or blacksmith, or entirely without mechanical experience.

Acetylene welding is a branch which can profitably be added to a blacksmith, tractor or auto shop. The cost of equipment is small, but the saving of new parts is very great and good money can be made. The trade can be learned in six weeks. Graduates of a course in oxy-acetylene brazing, welding and cut-

ting are prepared to go immediately to positions in factories, or to start shops of their own throughout the country, which shows that they are competent to be immediately successful.

The illustration shows the method of "learning by doing" in practice.

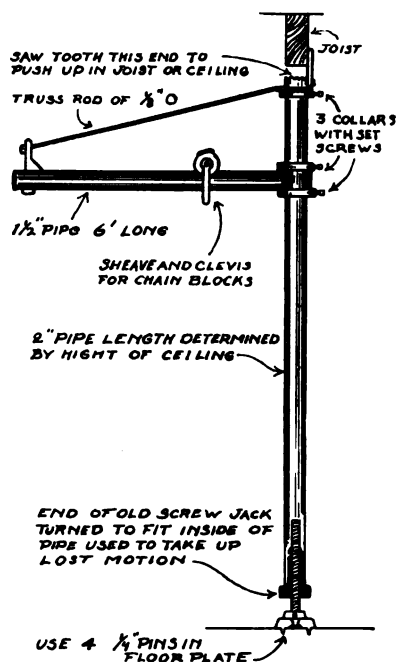
A Practical and Portable Shop Hoist

PETER K. SHNYDER

A simple and most effective portable hoist is presented in the accompanying illustration.

The illustration and explanatory notes indicate clearly how this hoist is constructed.

In use it is placed between one of the rafters of the shop and the floor and the jack-screw screwed out. The addition of a piece that will bear against the joist is suggested to prevent any possibility of the saw toothed pipe from slipping.



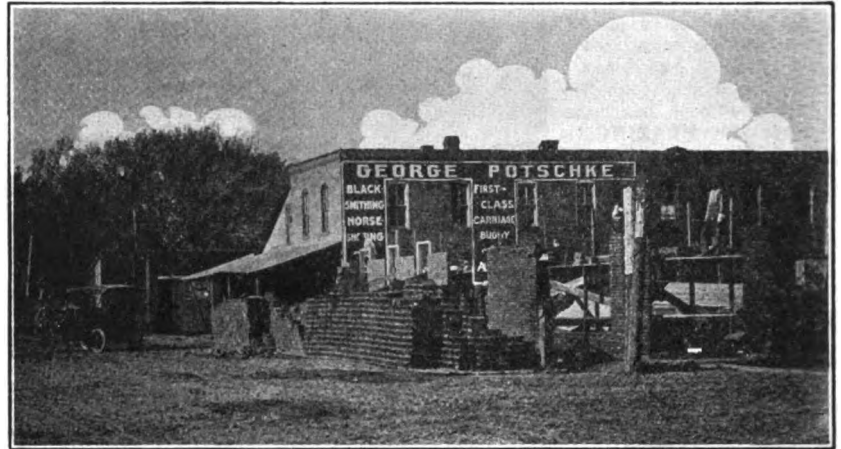
A CONVENIENT PORTABLE HOIST FOR PULLING MOTORS AND OTHER HEAVY LIFTING ABOUT THE REPAIR SHOP

The six foot arm of the hoist will give a 12 foot radius and can be used to not only lift motors in and out of automobile jobs but for other heavy jobs about the shop as well.

Caring for Tools.

It is an admirable idea to wrap good tools, such as drills, wrenches, etc., in oiled cloths before stowing them away in the tool compartment. The oiled cloth prevents the implements from becoming rusty, which is quite likely to happen in the course of a strenuous season's running.

The Reason One Man Enlarged His Shop



LET MR. POTSCHKE TELL YOU WHAT HIS EXPERIENCE IN THE AUTOMOBILE REPAIR BUSINESS HAS BEEN. HE IS STILL ADDING TO HIS SHOP AND EXTENDING HIS BUSINESS

How the auto repair business pays can be best judged from the following article, the facts of which are given by Mr. George Potschke, of the Rock Port Garage and Machine Company, and speak for themselves.

The shop, shown to the left of the accompanying illustration, was erected in 1900 and was originally 20 by 40 feet but, Mr. Potschke says he always had trouble on account of the building not being big enough. First he found that his shop was too narrow and it became necessary to enlarge the shop, making it 40 by 40 feet. Then after some time it was found necessary to add 32 feet to the length of the shop making the dimensions 40 by 72 feet and this did not include the out-buildings that were used for storage purposes.

Mr. Potschke states that he got along "fairly well" until the automobile began to grow in popularity and its many advantages became known, until two years ago it became necessary to expand again and a 72 by 72 foot addition was built to the old building. "It looked very big beside the old shop," he says. "but on busy days, everything is crowded."

The garage has storage room for about 30 cars besides sufficient room to permit working on three or four "cripples."

The list of prices compares well with those charged at city garages and are very reasonable compared to some.

Mechanical work is charged for at the rate of from 75 cents to \$1 an hour and this is increased to \$1.50 or

\$2 an hour if it is necessary to do any machine work requiring the use of power. Oxy-acetylene work is charged for at the rate of \$1.50 an hour in addition to the cost of the gases and other materials. The price for small jobs such as adjusting carburetors and spark coils is 50 cents, up to a half hour.

Cars stored by the month are charged from \$5 to \$7.50, storage over night, 50 cents, 24 hour storage \$1 and for storage of a few hours 25 cents is charged.

No "side lines" are carried but the shop is equipped to handle everything that is brought to it, as Mr. Potschke says, "if the other party puts up the money for the time."



Carbon Removers

Many fluids for removing carbon from the cylinders of internal combustion engines have been placed on the market, says the *Scientific American*, and they would be comparatively satisfactory if they could be made to operate as they are intended. To use them they must remain in contact with the carbon for some little time in order to soften it so that it can be blown out by operating the engine; but to do this the space between the piston head and the cylinder head must be completely filled, and in a dirty engine the piston rings and valves are not tight enough to retain the liquid in contact with both of these surfaces very long. Consequently, although the piston head may get a sufficient treatment, the cylinder head, where the principal trouble usually exists, does not get its share. Most of these liquids are composed largely of acetones; but wood alcohol, applied in the same way, produces fairly good results if put into a warm engine and left over night.

In either case the liquid that leaks past the piston rings finds its way into the base and so contaminates the oil that it must be entirely removed, and a fresh supply poured in after every treatment with the de-carboniser. Another point should also be kept in mind, and that is that, although the head of the piston may be well cleaned, it is impossible to properly clean the piston rings by this treatment, for while the carbon around and under them may become softened, the liquid does not dissolve the carbon, and consequently the condition of the rings is not improved.

Burning out the carbon with a blowpipe will clean the upper part of the cylinder and the piston head, but this process cannot clean the rings, and when an engine requires decarbonising the rings are sure to be in a condition that demands attention.

With wheat at over \$2.00 a bushel, the average farm is worth more per square yard than the average gold mine.

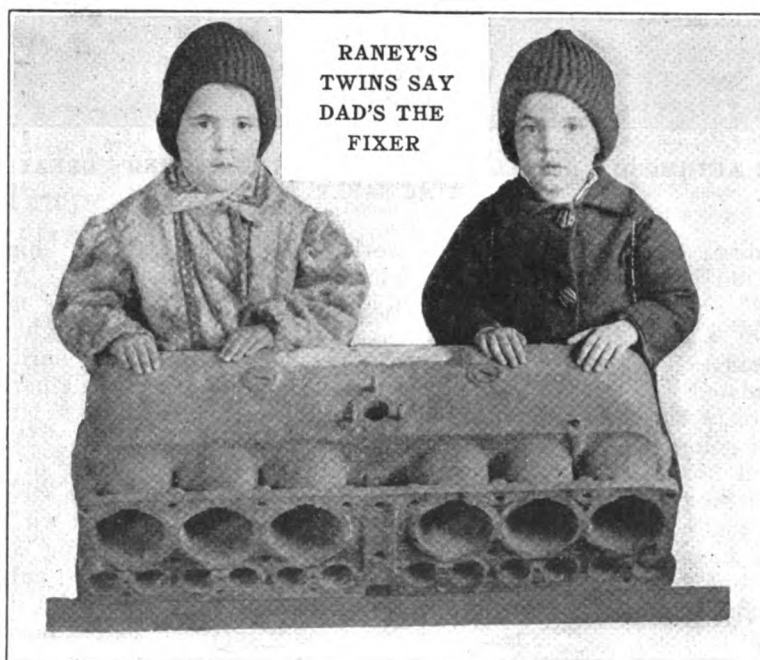
Made in America

The place in which an article was made has for centuries been a hallmark indicating its quality, and much stress has been placed on the location of manufacture for many years past. The time was when the gentleman warrior was not satisfied with a sword other than one from Damascus. The Venetian has been the world's ideal in the manufacture of glass, and perpetual homage has been paid silks and pottery of Chinese origin.

Too little credit has been given to American-made goods, even in view of the fact that in most lines of manufacture the home producer is the equal of any in the world, and that in many instances he knows no equal in the matter of production and quality.

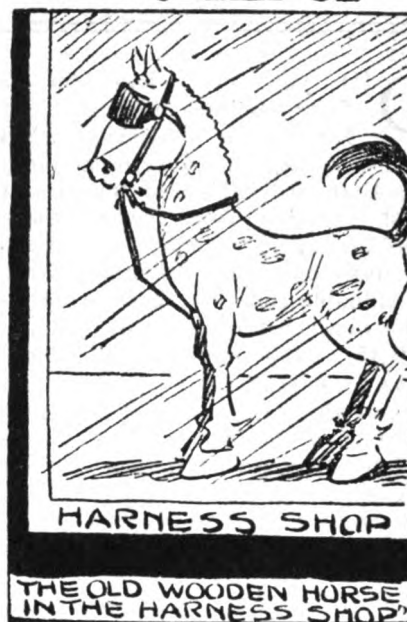
For many years American goods, especially standard lines, have been marked as imported, in many cases without their even leaving American shores. An all too eager, but indiscriminating market has bought them, believing itself a most astute purchasing agent, when in reality it was merely paying a commission to deception.

Every American has something in the way of wares, service, or personality which he must sell, and as his chief market must always be at home, it is a matter of the simplest logic that he should buy at home, thereby developing a most powerful application of interior reciprocity.



A CLEVER PIECE OF ADVERTISING COPY USED TO BOOST RANEY'S MODERN SHOP IN THE "SHOW ME STATE"—THE TWINS ARE GIRLS

WHAT HAS BECOME OF -



The world war has proven America to be the one self-sustaining country on earth.

The advantages, in a national sense, of being independent in production and consumption are so obvious that we should, after the war, voluntarily continue the practice that conditions have necessitated of preferring goods made in America.

Renewing Socket Wrenches

In the repair shop square or hexagon socket wrenches quickly become worn so that they will not hold on the nut heads. To renovate these proceed as follows: Take a piece of stock and grind it or forge it to the original size of the socket. Heat the wrenches well and drive the plug into the box end, hammering the worn box into shape. Finish off the socket and harden and the wrench is as good as new.

—
 "The man who once most wisely said: 'Be sure you're right then go ahead,' Might well have added this, to wit: 'Be sure you're wrong before you quit!'"

Farming In The Good Old Days That Were--And Now

DID you ever live on a farm before the day of rural free delivery, when the smelly and smoky kerosene lamp was Standard Oil's best friend and most valuable asset, before there were any rural telephones and when a trip to town generally meant a day of valuable time lost to some necessary work on the farm—did you?

"Ah, those were the good old days" we hear some one sigh, but this myth of the good old days that were, when the farmer was almost as isolated from civilization as the most benighted heathen on India's coral strand, are quite generally discredited by everybody—even the farmers (and who can blame them) are hitting the gasoline trail and they would no sooner return to their conditions of living as they existed on the farm ten years ago than we would want to be suddenly restored to the Colonial style of living. True there are some reactionaries who would insist that men and women were happier and healthier under such conditions but—oh well, we have a distinct recollection of having heard somewhere of a party named Ananias who probably voiced such sentiment about "the good old days" in his time.

Ten years ago living on a farm was anything but a picnic. The farmer was practically isolated. If he got any mail or papers to keep him informed of what was going on in the great world around him he had to make a special trip to the post-office, in many cases a trip that occupied a whole day or more to make. If he wanted to take a load of produce to market he had to gather his load the day before and then spend all night getting into town in time to dispose of it.

Those were the good old days alright, when every statistician agreed

that the percentage of insanity among farmers' wives from the endless drudgery and solitude was higher than in any other class of people.

Today the farmer is buying automobiles, both pleasure cars and trucks and besides he is buying tractors. He is buying these machines for exactly the same reason that he bought a mowing machine, a binder or any other piece of farm machinery that no reasonably progressive farmer would consider doing without today—he did it because it saved him work and because he was

at one operation and does it quicker and better than formerly it was possible to do only one of these operations.

Do you wonder why the farmer is buying these things? If you do there is something wrong with your think tank. And don't get the notion that the farmer is going to do his own repair work himself. He is like everyone else, he will do what repairing he thinks he is capable of and then call in the repairman for the job that he knows nothing of or isn't willing to tackle. The man who has done the

farmer's repair work in the past is the man who will continue to do so in the future if he is capable of doing it—**ARE YOU THE MAN?**

Dressing Chisels

If a chisel, or any other tool, is properly hardened, it will stand up well even if the temper is not drawn to the exact color. But if the tool be heated too much in handling it will not stand up, however good the subsequent temper. Steel about 0.75 carbon is best for making all kinds of cold chisels, yet some bars of octagon steel are

much higher in carbon than others. Any time you have to dress or make a cold chisel from very high carbon steel, say one per cent., harden it at as low a heat as it will harden at successfully, and always let the temper run down lower. For ordinary use, let the temper of a chisel made from *high carbon steel* draw to almost a grey, and it will give good results. When dressing cold chisels always cut off the old cutting edge after the chisel is drawn out to the right thickness, before hammering for the last time.

—o—

O. W. Nut is a blacksmith in Kansas. Happily his middle initial is not "U."



Courtesy Maxwell Motors Co.

THE AUTOMOBILE OF ALL INVENTIONS IS THE FARMER'S GREATEST TIME SAVER

able to get his work done quicker than he could if he had to cut his crops with a scythe or thresh them with a flail.

The automobile, of all inventions, is the farmers' greatest time saver. His light, swift running car takes him to town and back in a few minutes. His truck carries his load of produce, gathered the previous day, to market in time to dispose of it under the most favorable conditions and return to devote his efforts and his energies to other work.

The tractor, which is only another development of the automobile, is one of the greatest boons to the farmer. With it he can—and does, do his plowing, harrowing and seeding

Naval Reserve Campaigns For Recruits

Plenty of Opportunity for Promotion, Good Pay and Many Adventures.

The Naval Reserve Force needs 1,000 recruits at once to be enrolled as seamen for the period of the war. They are to be sent to Pelham for training and as this is the finest training camp in America, the opportunity should not be missed.

Lieutenant Joseph F. Wright, U. S. N. R. F. quotes a description of the advantages of such services recently given by Commander John Grady, U. S. N. as follows:

"The life of a sailor—with its adventures, ever-changing scenes, new countries, new people has appealed strongly to the imagination of men of spirit.

"Any American citizen who thinks of enrolling in the Naval Reserve may feel sure that, on enrolling, he will enter a service in which he may and should feel a justifiable pride, and of which the uniform is a badge of honor.

"This branch of the service offers a livelihood and good practical training, opportunity for promotion and provision for old age. In addition to clothing outfits, good food and keep, the seaman is well paid.

"If in the draft, go to your Local Board and they will give you a letter permitting enrollment in the Naval Reserve. All enrolling offices of the Navy throughout the United States will accept applicants, including the regular enrolling offices at No. 115 Flatbush Ave., Brooklyn; No. 34 East Twenty-third St., the U. S. S. "Recruit," in Union Square; No. 225 West Forty-Second Street, and No. 51 Chambers St., New York.

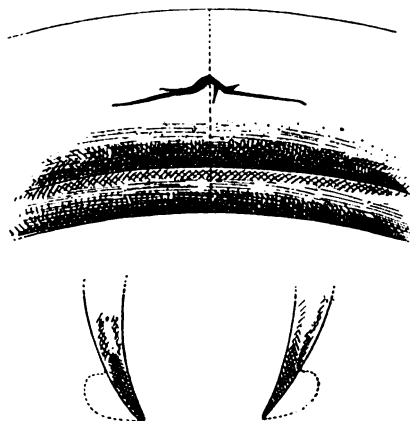
When Drawing Temper

The slower a temper is drawn, the tougher the steel will be. When steel is slowly heated in tempering and the heat is distributed equally over the entire piece, the molecules, or particles, assume the most stable position with regard to each other, and when the tool is in use, all are alike affected by any shock sustained. The effects of heat on copper and bronze are exactly opposite to these manifested by steel, as when such metals are cooled slowly they become brittle and hard, but when cooled rapidly soft and malleable.

A dollar will place your name on our list for a full year's subscription. Better send it in today.

Blowout Patches from Old Casings

Blowouts happen with the best of tires and when this happens the owner limps along to the nearest repair shop, unless he is equipped with spare tires.



BLOW OUT PATCHES AND RELINERS FROM OLD CASINGS

A good blowout patch that will answer for just such cases can be made from a casing that has seen better days by cutting in two at the dotted line. Then cut off the beading as shown by the dotted lines in the lower figure. Put one end of the casing in a vise and then peel back the rubber and one layer of the fabric.

This liner or patch can be placed inside the tire in one piece or cut up into lengths about a foot long and placed inside the tire underneath the hole that has been blown out.

A Growing Business

In 1917, 7,235 automobiles were stolen in nine large cities of the United States. Detroit leading with 2,136. Of the machines stolen, 5,451 were recovered, leaving a net loss of 1,734. Convictions were comparatively few, which explains in part the magnitude of this growing industry.

In some cities it is impossible to insure automobiles against theft, due to carelessness of owners who feel that they are protected, and to the boldness of thieves who are sure to be treated leniently in the courts. Ruthless prosecution and certain punishment are needed to check this growing evil.

The push rods on an I. H. C. 10-20 h. p. gasoline tractor frequently break at the threaded end. The blacksmith can easily weld on a new end but should obtain a half inch die 13 threads per inch, as the ordinary V-thread die is only 12 threads per inch.

Helpful Hints for the Repairman

Manure Injures Finish

Farmers who have been accustomed to garaging or storing their cars for the winter in or near barns with horses should cease the practice, as the gasses given off by the manure are injurious to the body finish of the car.

Changes in Temperature

Changes in temperature are likely to affect the finish of a car because of the difference in expansion between the metal and the paint and varnish. To insure that the paint be prevented from cracking, the car should be kept in a garage of as nearly uniform temperature as possible. Extreme heat or cold are not desirable, but a comfortable degree should be maintained.

Separating Gear Cases

When separating sections of gear boxes or crank cases, it will sometimes be found that the parts stick together after the bolts have been removed. Care should be taken in separating them, especially if the parts are of aluminum. Driving a chisel or screwdriver between the two sections may make a nick, which will spoil their oil-tightness, or may raise a burr, which will prevent the parts from coming together properly. The application of too great force may cause the parts to spring. Gently prying at a number of places, after the stuck parts have been tapped all around with a light hammer, will usually separate them without damage.

Loose Check Nuts

Loose check nuts on the rods in the braking system may become the cause of a serious mishap, if they are not remedied in time. When the check is removed from the turn-buckle or other adjustment, the tendency of the vibration is to loosen the adjustment of the bands. As this may occur when the car is running, the chance of having the brakes fail through slack adjustment, it is worth taking into consideration.

End Play in Crankshaft

End play in the crankshaft is apt to be first noticed when the car is throttled down to about five miles per hour, when so-called buckling will take place accompanied by knocking. If the play is excessive, the knocking will be heard as the speed increases. This condition may be caused by the main bearing ends becoming flattened or worn too much so that the shaft can move back and forth, and as it does so it pounds against the bearing ends still more. In many cars with four-bearing crankshafts, the second bearing from the rear is designed to take the thrust, hence replacements of that bearing is sufficient. In three-bearing shafts the center or rear bearing usually is the one which requires replacement. In the four-bearing shafts it is best to simply replace the one bearing instead of attempting to remove the play by using two or three bearings with thicker flanges.

Gasoline in Terms of Dynamite.

It may help drive home the danger of gasoline and consequent need for care in handling it to compare it to dynamite in explosive force. Such an argument should have much weight in handling careless employees.

Gasoline at even a low temperature constantly throws off an explosive vapor. Five gallons of gasoline will generate 8,000 cubic feet of gas, which, if ignited, expands 4,000 times. One gallon of gasoline properly mixed with air and compressed is equal to about 83 pounds of dynamite in explosive force.

Painting the Automobile—5

M. C. HILLOCK

From the Viewpoint of a Practical Vehicle Painter.

The automobile painter should give careful study to the subject of colors and color schemes most suitable for the car. This is a day when the car owner, both from city and country, is giving attention to fashionable colors. For proof of this the writer has only to refer to the attendance at the late automobile shows held in New York. Here were dozens of millionaires rubbing shoulders with people from the middle West and even farther west, many of them, as the writer learned from conversation, being good people from the country who were visiting the Metropolis to see what the automobile offerings were at the country's leading shows. These fine people take away, quite as do the millionaires, impressions which influence them, and incidentally their neighbors, in the choice of colors and the general quality of work when their automobile equipment is turned over to the painter for renewals. It pays therefore to keep informed as to the colors most liked by people in general and what is esteemed in the great centres of automobile industry as fashionable.

In these times of war fashionable colors must have and do have, as a rule, something more than mere attractiveness of tone and shade to make them popular. They must have wearing qualities, cleanable qualities, along with the capacity to show dirt and road accumulations at the minimum. Then, too, they must be suited in a way to the surfaces to which they are applied so they may lend certain important effects to the vehicle not to be had otherwise. For example, black while showing dust and dirt very plainly has a diminishing effect upon the surface, making a big car appear smaller in size than it really is. By some owners this is deemed an important virtue. Red has a warm effect and for this reason it is a most popular color with people who are able to own more than one car and who prefer red for winter service. Deep greens, and blues, and blacks, are fashionable colors at all seasons of the year and with all classes of car owners, but of course they are not always regarded as the most economical colors. Moreover, a great number of drivers prefer something less dignified and sombre.

Maroons and lakes and medium browns and various shades of gray are colors which people like. Especially the grays running from

trench gray through to battleship gray to elephant gray and even deeper shades of gray. The gray colors are favorites because, for one thing, they are neutral pigments and therefore suitable all-the-year round colors. They show dirt and the evidences of road service less than any other colors; they are easy to keep in order, wear tenaciously, and any one at all trained in handling a brush can apply them. They are solid covering pigments and for this reason require no special ground color, as many of the fashionable colors do. And another advantage possessed by the gray colors is that they look as well on the smaller touring car as on the sedan.

It would be a good plan for the car painter to send to the various color grinders and obtain samples of the various colors turned out. From these samples he will be able to assist the car owner in making a choice of colors, or combination of colors, for his vehicle. These little attentions pay; they help to create a friendlier feeling between owners and painters, and such relations often bring new business to the paint shop.

A good knowledge of the colors most fashionable and most useful to the various classes of car owners is an asset of value to the painter or to anyone conducting a painting business.

The automobile shows also prove that good striping helps to set off the colors and to conceal many small surface defects which might otherwise be noticed plainly. For the gray colors lines of white and ivory white, and gold, and even deep red, give a fine touch of color contrast to the big fields. It is always a good practice to apply some striping to the car that is being repainted especially if one is not sure that the finish will prove strictly high-class.

The shows have another lesson for the painter, to wit: The full varnish lustre is the best finish for the reason that it affords the best protection to the colors. This is an important consideration owing to the fact that colors are durable, chiefly, only to the extent that they are protected by the varnish kept over them. This is why the oil paint finish for the car has been found of comparatively small value as a wearing finish. Such a finish, as you may know at a glance, will not stand cleaning with any cleaning or renovating medium now in use, all such agents serving to grind and scour the paint to a rough, smeary blur.

It will prove economy to hold fast to the finish that uses a number of good, solid varnish coats, and is capped off with a coat of durable wearing body finishing varnish. In case any of the deep greens or blues are used as main body colors for enclosed cars it is always in order to have the upper and lower panels coated black.

This year many cars with dark colored bodies have wheels and running parts painted bright red. Sometimes this plan is varied to the extent of making the wheels white, and letting the running parts go in the regular body color. If these various color schemes are given thought and an attempt made to interest car owners in the subject of choosing not only fashionable but adaptable colors when having their vehicles repainted, it will many times call new business to the shop in addition to retaining old friends.

The average car owner likes to feel that his painter is up-to-date and widely informed as to all the latest developments in his craft. Such information therefore is of value aside from what it may do to make one more efficient.

It may happen that you have an order for a deep lake color for the main body panels of the car. In painting a lake field make the ground color correspond as nearly as possible with the lake color. As a rule, lakes are rich in proportion to their depth. Avoid by all means getting the ground color too light. For a deep lake it is best to have wine color for a ground. Mix the lake in rubbing varnish in the proportion of, say, one ounce of color to one pound of varnish. Over a good ground color this will give after two coats of the lake have been flowed on a fine, rich, lake. The next coat of varnish should carry a half ounce of the lake in say a pint of varnish. It may be said here that a pint of varnish will in weight approximate one pound. This small addition of color will prevent the varnish from destroying the purity of the color. This is an important thing to remember in connection with the use of all semi-transparent pigments, or colors of a delicate shade or tone. Unless some of the color is carried in all but the last coat of rubbing varnish—just enough to keep the color true—the finish will disclose the field color considerably "off shade," so that as a color display it will have little value.

In applying lake coats in which varnish predominates a half elastic soft bristle brush will be necessary, or a badger hair brush of a width to

enable the workman to get over the surface before the material begins to set up.

Good results in the use of all varnish-color or glaze coats are directly in proportion to their free flowing properties. Such colors look well only when they flow out well and richly. Perhaps we should say that the same advice applies to the use of maroon, a color very popular with the owners of big touring cars. In painting a car maroon for the main panels it is good practice to paint the moldings black, fenders and upper panels black; wheels a lighter shade of maroon. Run a fine line of bright red around the main panels. Use plenty of varnish coats in getting the finish, and the result will be most satisfactory.

A great many car painters are having trouble from the effects of the various wax and other polishes used by owners and employes to give the finish an artificial polish or lustre. When such treated cars come to the shop for repainting all traces of these polishes must be removed before the work of painting may be proceeded with. If the surface is cracked to any extent it is practically certain that the polish has penetrated the checks and crevices. From these depths it is most difficult, if not impossible, to remove.

A wash of denatured alcohol, followed with one of turpentine, and then a careful rubbing with water and pumice stone flour, will, in a majority of cases, remove enough of the material to enable one to apply color and then varnish-color, and so keep the polish from working out through the finish and thus destroying the lustre.

In case this method fails to take out enough of the polish to let the work come out correctly, the only remaining plan that we know of is to remove with varnish remover, or with the burning torch, the old paint and varnish fabric, and repaint from the bottom.

All jobs as they are taken in should be carefully examined, and any traces of polish found explained to the owner with a statement of possible results. No painter can afford to guarantee a finish built over one of these surfaces saturated with polish; his best protection is to detect the presence of the polishes when the car is brought to the shop and to then fairly explain the situation to the car owner before proceeding with the work. Many city painters charge an extra fee for removing, or trying to remove, the polishes, and

in case the paint has to be burned off the owner of the car is compelled to stand the expense, as is proper. Many of the surfaces under the polish are found rotten and decayed, and in all such cases the finish must be entirely taken off.

This is a period when the small shop owner will need to take every means possible to prevent waste. Much of this occurs in the mixing of paints and colors unless measures are taken to prevent it. Even in the small shop it is a wise plan to have one man assume charge over the mixing and preparation of all materials used. This man should have a natural talent or gift for mixing and matching colors. Such a man can alone make a saving at the mixing bench. He makes no waste, or at least, but very little, provided he is careful and painstaking, and if he is not then he had best be given other work.

For the small shop the varnishes should be received in containers suited to the size of the business. Varnish if received in quart containers and then opened for use keeps in better condition when but a comparatively small consumption daily is made. Ordered in the larger containers when the daily consumption is comparatively small the material thickens through evaporation of its volatile mediums and becomes unfit for use until it is given some special treatment, and the painter not being a varnish maker is never able to convert the thickened material to a smooth and effective working, flowing and drying varnish. By getting the varnish supply in quart and pint containers, as his needs may suggest, the painter may be able to show a substantial saving over the larger containers.

Also, in buying turpentine it is advisable, if a substitute is to be used for the all turpentine product—and we doubt the economy of this practice—to buy the pure turpentine and then personally add the extenders. In this way the article costs less and you know precisely what proportion is turpentine and what the proportion of other mediums is. At any rate, shun the benzine-turpentine combination for use in fine coach or car colors. Benzine causes the color to set up too rapidly for clean, smooth work. It also gives the color a rough, gritty condition. Then, too, benzine is a dangerous material to have in the paint shop, and ordinarily it is against the insurance regulations. In these war times it pays to strain the varnish both be-

fore beginning and after completing the varnishing for the day. In this manner the refuse or left over portions of varnish are reduced to the minimum. There is really little excuse for a container loaded with varnish bottoms and dribs; straining the varnish, and preventing waste through evaporation, saves and conserves the supply.

An Emergency Spring Weld

Broken automobile springs are troublesome things to weld any time but particularly when the leaf breaks off near the bolt hole as it is a very difficult place to make a weld.

By welding with the oxy-acetylene flame and building the metal up, as shown about the shackle bolt hole, and using a mild steel filling rod, the chances of getting a weld that will hold until permanent repairs are made are increased.



WHEN A SPRING BREAKS AT THE EYE ABOUT THE ONLY WAY IT CAN BE WELDED IS AS SHOWN—THE OXY-ACETYLENE WAY

This, like all other spring welds can only be considered as an emergency repair until a new leaf can be inserted.

By making the weld in this manner it is not necessary to remove the spring from the car as would otherwise be necessary as the car can be jacked up until the two pieces line up and can then be clamped together.

Testing Gasoline

The motorist who wants to test his gasoline for purity may find the following suggestion useful: Put some gasoline in a bottle and add a little concentrated sulphuric acid. Shake the bottle well at intervals for three or four hours. The acid will form a distinct layer of stratum, drawing into itself all the impurities in the fuel, so that the degree of discoloration found in the acid will be a measure of the purity of the gasoline. A useful test to determine whether gasoline has corrosive properties is to drop in the fluid a bit of copper. If the copper turns blue or green the assumption is that the gasoline contains corrosive elements.

Radiator Cleaning.

One of the simplest and most efficient methods of cleansing the radiator of the scale which forms in it is to fill the water system with a strong solution of washing soda and hot water, running the engine for about fifteen minutes. The soda solution is then drained out of the system and the scale will come with it. Do not race the engine while carrying out this process.

The Army Horseshoer

Much filing of the clinches weakens them and results in a cast shoe. When finished the clinch should be a trifle longer than the width of the nail at the point where it comes out of the wall.

The outside wall of the foot is never rasped (par. 46).

The toe clip should be hammered back against the wall of the toe after the inside has been clinched on the off feet and the outside on the near feet. In other words, hammer back the toe clip when the right arm is free.

After the shoeing has been completed the foot is again allowed to rest upon the ground, and again carefully examined from all sides.

When all four feet have been shod the animal is taken out and again examined on level ground at a walk, trot and gallop.

Plate XI shows the near forefoot of a newly purchased Cavalry horse. The shoe, as may be seen, has been on for about three months, and the foot is broken back. The lack of symmetry at the heels shows that the shoe was probably not correctly fitted, and that it certainly was not in proper position when nailed on.

The shoer, having learned to fit normal shoes, is prepared to take up the study of shoeing to correct faults in gaits and shoeing as an aid in the treatment of diseased feet.

Inspection of Shoeing

58. The horses shod during the day should be ready for inspection at afternoon stables, or other convenient time, in the shop or stable, with their feet cleaned.

The horse should be examined on a level floor, as otherwise it is impossible to determine whether he is standing correctly or not.

The following examination should be made while the foot is on the ground:

(a) Pastern and foot axes—View the foot from the front and side to determine whether the axes are correct. (Pl. VII.)

(b) The fit of the outline of the shoe—does it correctly follow the outline of the wall to the last nail hole, and from there extend outward, allowing proper space for expansion? (Par. 54.) Note particularly whether the wall has been rasped to fit the shoe. (Par. 46.)

(c) The toe clip.—Is it in the center? Is it of sufficient strength, height, properly finished and seated? (Pars. 50 and 54.)

(d) The nails.—Are they evenly driven, the proper height and dis-

tance apart? Have any old nail stubs been left in the wall? (Pars. 56 and 57.)

(e) The clinches—Are they of proper size. Are they well turned and set in? Are they smoothed off and not rasped sufficiently to weaken them? (Par. 57.)

The foot should then be raised and the examination continued in the following manner:

(a) The shoe—Is it of the proper size and weight? The last nail hole not farther back than the bend of the quarter. (Par. 52.)

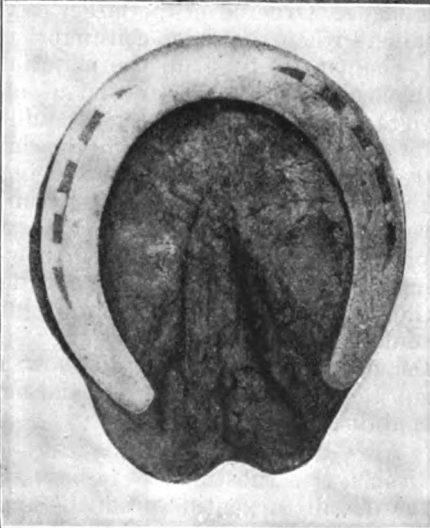


PLATE XI—FOOT IMPROPERLY SHOD AND NEGLECTED

(b) The preparation of the foot—Has enough horn been removed? Has too much been removed? (Par. 45) Is the foot level? (Par. 48.)

(c) Bearing surface of the foot—Does the shoe rest evenly on the wall, covering the buttress and showing no air spaces at any point? (Par. 54)

(d) Concaving of the shoe—Is the shoe properly concaved? No sole pressure at any point? (Par. 54.)

(e) Use of the knife—Has the knife been used on the bars, sole or frog? (Par. 45.)

(f) The nails—Are they well

seated in the crease? Are they the correct size? Are they all of the same size? (Pars. 56 and 57.)

(g) The heels of the shoe—Are they the correct width and thickness, edges or points? Is their length even with the bulb of the frog? (Pars. 14 and 54.)

In cases where animals have been shod with calks shoes the following should also be noted:

(a) Toe calks—Is it properly secured and of proper height and length?

(b) Heel calks—Are they of the same height as the toe calks? Are they properly turned and finished?

After becoming accustomed to making the daily inspection, the time should not exceed five minutes for each horse.

Gaits—Shoeing to Confirm or Alter Same—Faults in Gaits—Shoeing to Correct Same—The Making of Special Shoes for Gaits.

59. In shoeing horses for the purpose of confirming or altering gaits, it must be remembered that there are almost as many variations in gaits as there are horses, and that methods which are suitable in one case may be unsatisfactory in another. There are certain important principles which properly applied, will be of material assistance in gaiting the majority of horses. Shoeing alone will not always accomplish the desired end, but it always helps. To shoe a horse so that he will be properly balanced and will travel squarely requires skill, patience, and careful use of special shoes. Where weight is used it is always best to start with a small amount of weight and gradually increase it until the desired result is accomplished; otherwise injuries may result from overtaxed, strained, or ruptured ligaments.

The horseshoer must bear in mind that seldom will shoeing alone produce the desired gait or action, but that much depends on proper riding and the physical condition of the horse.

In all cases of shoeing to prevent injury to a leg or foot by another, if, with careful riding, moderate correction methods in shoeing do not accomplish the desired results, shoe normally and use boots to protect parts liable to injury.

The use of boots or bandages will render blows of one foot against another foot or leg painless, give the horse confidence, and if the blows are mild, with the use of boots they will only slightly affect his gait.

60. The gaits in the Army are the walk, the trot and the gallop.

The Walk

61. At the walk, the horse lifts one foot at a time, in diagonal sequence, as, left front foot, followed by right hind foot and plants them in the same order.

62. The trot is a diagonal movement, in which two feet leave the ground and again strike the ground at the same time, as, the left front foot and the right hind foot. If the horse shows a tendency to single foot, the toe-weight shoe in front (Pl. XIII, fig. 2) is often of benefit. The toe weight increases the length of the stride and gives a long, reaching swing to the front feet. After the horse trots steadily the toe weight may be gradually decreased and finally abandoned.

63. The gallop is a gait in which the horse springs into the air from one front foot and has all four feet off the ground at once. The diagonal hind foot is the first to strike the ground, then the other hind foot, next the front foot opposite the one from which the spring was made, and last the foot used for the spring.

Animals that are so frequently used at the gallop as Army horses should carry as light a shoe as practicable.

64. The pace is a lateral movement; that is to say, a movement in which two feet on the same side leave and strike the ground at the same time. If a horse shows a tendency to pace, it is often of benefit to shoe the front feet with a medium-weight shoe, well rolled at the toe, or a roller-motion shoe. (Pl. XII, fig. 3.) A confirmed pacer can very rarely be converted to the trot by shoeing alone, it being generally necessary to use hobbles, uniting diagonally a front leg and a hind leg. The pacer should have no place in the service, but, if present, should be shod with a normal shoe.

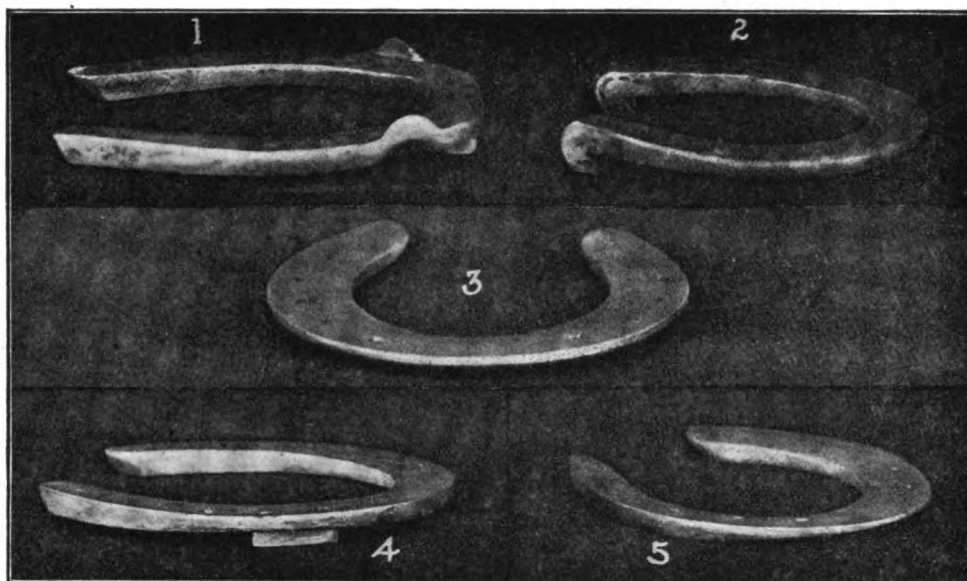
(To be Continued.)

Handy Tool for Lifting Cylinder Heads

Here's the latest "racket" for removing cylinders and cylinder heads from automobile engines when it is necessary to grind valves or remove carbon.

Everyone who has done automobile work of this sort knows what a job it is to pry the cylinder off with a screw driver. He not only bends the screw driver, but "jims" up the gasket, in many cases so badly

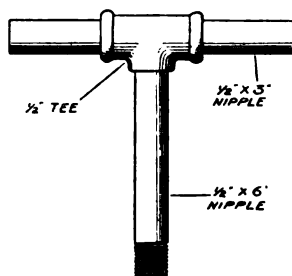
PLATE XII—SPECIAL SHOES FOR CORRECTION OF FAULTY GAITS



that a new gasket is made necessary, and in some cases the casting drops on his fingers with disastrous and painful results.

This tool is made from pipe and fittings available anywhere. Two of these tools are necessary, one being screwed into the front spark plug hole and the other in the rear.

As shown the tool is constructed of $\frac{1}{2}$ inch pipe and can be applied to most of the popular four cylinder cars now in use.



HERE'S THE TOOL THAT SAVES CYLINDER HEAD GASKETS AND KEEPS YOU FROM BREAKING THE THIRD COMMANDMENT

Another method of making this tool is to use spark plug shells and attach a handle to them. These can be made in two sizes to accommodate the two different size spark openings.

Building an Eight Cylinder Ford

Everyone interested in automobiles or motorboats has desired at some time or another, to tie up two Ford engines together and thus develop more horsepower. This is a particular hobby with Ford owners addicted to racing.

Two Ford motors can be connect-

ed together but unless you consider that you are an expert mechanic and have access to the necessary tools and equipment you will save time and money by letting the matter alone.

The usual way to connect the two engines is in tandem; by placing the two motor blocks end to end. Then the two crankshafts are welded together and the camshafts are welded together in a similar manner and in such a way that the firing of one engine will come half way between the firing of the other. Naturally, the alignment of the crankshaft and the camshafts will have to be exact and the crankshaft journals will have to fit the bearings in the cylinder castings.

Welding the two shafts together is the most difficult and the most important part of the work. The rest is comparatively simple. The two crank cases will also have to be welded together in some manner and of course an eight cylinder ignition outfit will be required.

After all the eight cylinder Ford is more of a curiosity than a practical necessity or practical possibility and where an eight cylinder Ford engine is considered — consider another motor rather than trying to hook up two Ford motors in tandem, or any other way—life is too short.

Fire Extinguisher.

The usually recommended substance for putting out gasoline fires is sand, which certainly has many advantages. Equally efficacious for the purpose is sawdust, particularly if it has been soaked in carbonate of soda. The sawdust floating in the liquid prevents air from reaching the fire and also a certain amount of carbon dioxide is generated. Sawdust is nominally combustible, but it burns slowly.

Queries-Answers-Notes



THIS department is the meeting place where you are free to ask for information, answer questions, discuss shop matters and business conditions and any other notes you feel would be of interest to a fellow mechanic. Make use of this Department as often as desired.

Welding Semi-steel Castings—As I understand it, semi-steel is steel mixed with cast iron before pouring into the castings. It is like malleable iron with reference to bending quite a bit before breaking, but is unlike it in structure as it has an even grain throughout. I have come across more of semi-steel castings on gas tractors than any other class of machinery. The trouble I have had is to weld without overheating the cast iron contained in the metal on account of the steel requiring a higher melting heat. I can make a nice looking weld with cast iron filler but it will be the weakest place in the casting, although maybe strong enough for the purpose. I have also used Tobin bronze filler but with not the same success as used on cast iron. With the same flux as used on cast iron the Tobin bronze does not flow over to make a sound union but a weak weld, although, may apparently look good. The way I have been welding semi-steel is to use a cast iron filler, adding plenty of metal to break, say half again heavier and trusting to the powers that be to hold and in most cases it works although I know it is not as perfect a weld as occurs in welding cast iron or steel.

F. H. Streibich, Illinois.

In Reply—Regarding the oxy-acetylene welding of semi-steel castings, good quality cast iron welding rods make the best filling material and a small amount of borax as a flux will give the best results.

It is absolutely necessary to reinforce or build larger at the break in order to get the desired strength but the "half again heavier" is more than necessary

from the experience we have had with semi-steel castings in this part of the country. (Buffalo).

After the casting has been pre-heated, the weld should be made as quickly as possible to avoid the re-melting that slow welding requires.

E. E. W., New York.

From Iowa—Elsewhere in this number is a picture of the up to date shop of Mr. H. A. Sommars, of Iowa.

Mr. Sommars does all sorts of blacksmithing, wagon work, horseshoeing, some automobile work and does inner tube repairing.

The Sommars shop is equipped with a three horsepower International vertical engine, two forges, one hand operated and the other operated by a Royal Chief electric blower, a wood turning lathe, a Little Wonder disc sharpener, two speed drill and a power saw.

Mr. Sommars makes all of his own double trees and gets his rough lumber direct from the log.

The saw was made from the old iron pile and can handle a log 18 inches in diameter by 12 feet long. The wood turning lathe is also a product of Mr. Sommar's ability as a mechanic.

A few of the prices charged at the Sommars shop are: Shoes reset 35 cents each; new common shoes 60 cents; steel plugs and Neverslips 75 cents each.

Co-operation and Prices in Tennessee—As I don't see very much from my section I will give you a few of my prices although I am a bit ashamed of my shoeing prices but it is the best I can do as my nearest

competitors are shoeing ten cents under me now. We do not seem able to get together on a scale of prices but we are from three to five miles apart. I visit them every chance I get and we loan each other material and help one another in every way that we can, fact is we are good friends but can't get together on prices. I am in the middle and the one on each side says that the fellow beyond him keeps him down. I will give you their names and if you have a couple of January numbers I request that you send them a sample copy. I think Mr. Will Bishop's sermon on Co-operative Competition will help.

Four new shoes, No. 3, \$1.10 cash; \$1.20 credit; Wagon woodwork, new axle, 2 3/4, \$4; 3 1/4, \$5; log wagon, \$6; new tongue, old irons, \$3 to \$4; new bolster with old irons, \$3; New hind hounds, \$3; new front hounds, \$4; new wheels with old tires, \$7.10 to \$7.70; Spokes up to 2 1/4, 40c; sawed fellows, 1 1/2 to 1 3/4, 40c; 9-foot reach, \$1.25.

Wagon iron work—New tires, 1 1/2 x 5/8, per set, \$16; setting old tires, \$1 each; set \$3.50; bolster plates, \$2; hammer strap, 35c; wagon wrench, 40c; box rods, each, 25c; king bolts, 3/8 to 1 inch, each 50c; wagon single trees, each, \$1.25.

Buggy woodwork—1 new shaft, \$2.50; two, \$4.50; cross bar, \$1; single tree, 75c; cutting down wheels, set, \$10.50; new spokes, 25c; half rim, 90c; whole, \$1.75; straight reach, \$1.50; two, \$2.75; Bent reach, \$2; two, \$3.50; Spring bars each, \$1.25.

Buggy iron work—new, 15/16 axle stubs, \$2.50; mending shaft iron, 75c; fifth wheel, new, \$3 up; setting new 3/4 tires or channels, set, \$8.50; setting old tires, \$1; set, \$3.50. W. O. Rambo, Tennessee.

Don't Take a Chance—I would like to know where I can get some information about building my own welding outfit. I saw something in one of the back issues some time ago but I have lost it.

Mississippi.

In Reply, our advice is most emphatically not to attempt the building of a home-made acetylene generator unless you are tired of this life. It is entirely possible for you to do this, but home-made oxy-acetylene plants are like standing behind a strange mule—you never know what is going to happen to you.

A number of serious accidents have been caused by just such plants and while it is entirely possible that you could build a safe and successful plant yourself we suggest and strongly urge you to purchase a plant and outfit from a reliable maker.

J. S. H., New York.

A Plan for Taking up Auto Work—The Editor recently wrote to a subscriber for his views on automobile work and this is what he replied, the name for obvious reasons, is not given.

"I fear that my views on automobile work will prove uninteresting as I am just taking up this line of work this year and know very little about the engine of a car. But I see other people learn it and of course I think I can and here is the way I am going to do it.

"Seventy-five per cent or more of the cars in my locality are Fords. I am going to put in a stock of repairs for the Ford, handle gasoline, oils and tubes and do vulcanizing and let the public know that I am in business by putting signs on all roads for four or five miles from my shop.

"I am going to get me a good book on the Ford and go to work and study. By carrying a stock of repairs I can get the



PALMER E. BATES' SHOP IN NEW YORK STATE. NOTICE THERE ARE NO PERUNA SIGNS TO MAR THE BEAUTY OF THE HUDSON VALLEY SCENERY

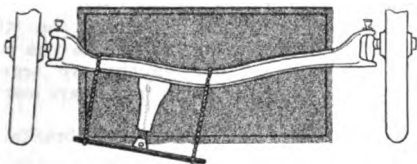
cars to coming to my place and with the aid of my books and by getting the car owners to talk and getting their ideas I can get into the business.

"When I see one of my customers pass my shop on his way to town to get repairs I feel that I ought to have that job and all that is necessary is, to equip myself with the proper knowledge, tools and repairs and go after it and that is what I am going to do."

This blacksmith has the right idea and is bound to get the business and make money out of it and his ideas on how to get this business are well worth following.

Straightening Auto Axles—It often happens that the repairman is called upon to take the kinks out of a front axle after the owner has tried to bend it around a telegraph pole or a tree. There are two ways of doing this and one of them is to remove the axle from the car, heat it and straighten by hammering, heating however, destroys a certain part of the strength of the axle and it is best to do the work cold, and this can be accomplished with but little difficulty and without removing the axle from the car.

It will be necessary to have a steel bar or shaft heavier than the axle to be straightened. A piece of steel beam or a piece of a railroad tie will answer the purpose very well. A couple of heavy chains and a screw jack are applied to the axle as shown in the drawing and the axle can be straightened as desired by screwing out the jack against the bent part of the axle.



PULLING TREES UP BY THE ROOTS WITH AN AUTO IS BAD BUSINESS—BUT THE REPAIRMAN STRAIGHTENS OUT THE FRONT AXLE LIKE THIS

Something to think about—The following is an extract from the minutes of the Blacksmiths. Horseshoers and Wagon-makers of Oklahoma:

"Mr. A. F. Ludwick, of Morris, next spoke on the advantages and importance of combining the blacksmith and auto repair work. He showed by his argument that they were dependent on each other, correlated with each other and were to a certain extent indispensable to each other, and earnestly urged the blacksmiths to equip their shops so as to handle this line of work to the best possible advantage as well as to the general satisfaction of the public."

Those articles on the Power Hammer—

Since the publication in the Blacksmith of a series of articles on the power hammer which I wrote, I have had a letter or two from brother iron stretchers in which they stated that, in their opinion, the cost of making some of the hammer dies and stamps would be such that it would not pay to make them because of the little demand for their use. It seems that the brothers in question did not get my full meaning in the case. As stated by myself in one or more of the articles in question, the stamps and dies sketched in the articles were put forward not so much for their particular merit as for their value in illustrating the class of tool to which they belong. The idea was to



IT WILL DO YOU GOOD TO READ ABOUT THIS SHOP OF H. A. SOMMARS

give those who are not familiar with hammer tools a general idea so that they could make such tools for themselves as their needs might require. It is up to the smith, himself, to make only such tools as he needs. He is the doctor, the judge, and court of last appeal in the case.

In writing on any subject that is of interest to the wide circle of readers, such as those of this magazine, a writer cannot, in most cases, confine himself to any iron-bound rule; he must write about those things, and emphasize and illustrate those points of his subject, which will strike home with the largest number of his readers. If the subject about which the writer desires to spout be dough-nuts, he must generalize on doughnuts. If it be tools for the blacksmith he must generalize on tools—must choose from the dozens of tools which might illustrate his point that tool which, in his judgement, is apt to be used, or required for use, by the majority of his readers. Such was my aim in writing the power hammer series for the American Blacksmith.

While I am on the subject, I wish to state, as I stated in the first article of the power hammer series, that a very small and quick-stroke trip hammer is not as adaptable to hammer forging as large hammer. In fact, with some of them it requires lots of patience and practice to do much under them but draw out only simple work. The tools, especially the stamps and dies mentioned in my articles are effective to their fullest extent only under a good heavy trip hammer, such as the heavier Beaudry or Bradley hammers, or a steam hammer. However, on work that the little hammer is capable of doing, those tools can be used to good advantage. I could sketch and describe dozens of hammer tools that are used every day under the steam hammer that would be entirely useless for the trip hammer in general use in the small shop. Never-the-less, I want to shout, bellow, and bawl that no smith ever had too many tools, nor any of any kind for which he did not at some time find urgent need. Tools is tools!

Will Bishop.

Farmers compete with Blacksmiths—I have been a subscriber for a good many years and don't think I would get along without it so long as I am running a shop and can spare a dollar to pay for it.

Since reading Bill Bishop's article on Co-operative Competition which I think is very good, it makes me think of conditions as they are here, and what we are up against is a plenty.

I am a firm believer in organization and some time ago the blacksmiths from three counties met and formed a local association and also decided to increase the prices on some work.

Shortly after the organization of our association the farmers got it into their

heads that we formed the union and raised prices to graft them and so they organized and built a shop of their own in this place and hired a blacksmith. These things occurred two years ago and the farmers' shop is still in operation. During this time they have had five different smiths and the one they have now has been in the place for almost a year, he seems to take a special interest in it and we understand that he has bought shares. We blacksmiths think that he cannot make the shop pay as he is getting \$100 per month salary.

This is a small town and had two shops before the new one came in and each was a one man shop. One of these shops has already been forced out of business and the other is just about to be as both smiths have large families to support and are unable to compete with the cut-throat methods of the farmers' shop. This is a bad situation and I don't think there is any remedy for it, but I would like to here from others what they think of this situation and whether they can suggest a remedy.

HABOLD HALVORSON, North Dakota.

Ore Wagon Tires—I feel that I owe a great debt for I have read the best ideas of other mechanics and have failed to give anything in return. In all the copies I have received for a long number of years I have failed to see anything on sleigh brakes so I will take that as my "text" so to speak.

In our part of the country we have from 90 to 120 days sleighing weather and this is the time that they haul the largest loads. Our roads are mountain roads and are naturally very steep and rocky. They haul loads of from six to eight tons of sacked ore on these sleighs, using a No. 6 sleigh with a 4 foot, 8 inch track so it can easily be seen that some very heavy work is demanded to put these sleighs in shape.

There is one mine here that they call the Nine Mile Hill. This is where they sure have to use the brakes. The road leads from the valleys until they get above the timber-line. On the wagons at the watering places they have to stop and pour water on the over tires. They get so hot that they have to be made extra heavy.

Some time later I will write you an article on sleigh brakes and their use and also putting these heavy tires on the ore wagons so that they will stay. These tires last from three to six months on these hauls so you can see that it requires considerable knowledge of the work to handle these jobs, and I suppose there are not many who understand handling such heavy tire jobs.

Last summer there was a school teacher here on a visit from Iowa. His father was a blacksmith and he used to drop in and pay me an occasional visit. One day I had one of these wagon tire jobs. I was putting on tires 2¼ by 1½ double. That gentleman stayed around all afternoon and watched us put them on and when we got through he told me that if he was to tell his Dad what he had seen he would not believe it, for the heaviest tire he puts on would be ¾ by 3 inches. I suppose there would be lots of other blacksmiths the same way and that is one of the reasons that we have such a difficult time in getting help for this class of work.

Joseph McDermott, Colorado.

Shoeing a Bursted Hoof—Sometime ago a mule was brought to me that had a hoof bursted in the center of the toe. The crack commenced from the hair and extended down the hoof toward the ground.

The mule was so lame that it was necessary to stop working him and he was brought to me to fix up in shape for service.

The first thing I did was to cut the crack in the hoof from the hair downward in a "V" for the length of the crack. I also went deep enough to touch the quick and leveled up the foot for the shoe. I put a very heavy, smooth shoe on the foot, and over the crack I put a plate of $\frac{1}{8}$ inch band iron, turned edge down so they would touch the hoof first. Then in, close to the outside of the "V" I put the screws to hold the plate, so when they were screwed down tight they would hold the hoof pressure away from the quick as much as possible.

After the plate was attached I cut a "V" shape from the hair about one inch wide and about $\frac{3}{4}$ inch down the hoof with the point of the "V" down. Then I took a piece of thin iron and burned at the edge of the hair through the skin and deep enough to get through the growth of hoof so when it started down, the hoof would come on new without any bursted place thus eliminating the cracked hoof.

Louis Ferrell, Missouri.

Annual Year Book of Oklahoma Association—The Ninth Annual Year book of the Oklahoma Association of Blacksmiths, Horsehoers and Wagonmakers has just been issued and the reports of the proceedings of the various deliberations of the association and the several excellent papers that were read by members at the meetings are of much interest to those in the business.

Copies of this year book will be mailed free on request to any person interested by addressing Mr. A. R. Bradshaw, secretary and treasurer, of the organization, at Okmulgee, Oklahoma.

Buffalo Shoeing Prices—The following scale of prices for shoeing went into effect February 1st in Buffalo, N. Y.:

One new shoe, 65c; Open shoes, per set, \$2.50; Resetting all shoes, per set, \$1.50; Resetting one shoe, 40c; New bar shoes, each, \$1.25; Bar shoes reset, per pair, \$1.25; One bar shoe reset, 65c; Rubber pads and patent rubber shoes, per set, \$6.00; Removable calk shoes, without calks, per set, \$6.00; Removable calk bar shoes, each, \$1.75; Rubber pads with removable calk tips, per set, \$7.00; Leather soles, per pair, 60c; Removable calks, per hundred, \$5.00. Extra charge for coach and speed horses. Absolutely no second-hand work done.

A Blacksmith's Attitude Toward the Automobile

"Twelve years ago I was doing a business of from \$20 to \$30 a day, employed three helpers in the summer and one in the winter. There was one other shop at that time which employed three men, a wagon shop doing wood work for them (I have always done my own).

"For five months of the year we were all busy. Now, one man can do it all most of the time and still not be crowded. I repaired the first automobile that came to town and predicted (when the wise-acres claimed that they never could make a go of it in the county) that there would be ten machines to one in the county at that time in less than five years.

"In less than two years there were over 80 machines at one resort in one day and had I not been unfortunate enough to become disabled I would have owned the first garage here. Today there are two garages already doing business and another in course of construction.

"A few days ago I counted 12 Fords on

the street at one time and only one horse drawn vehicle and that was only a light cart.

"I have heard numerous blacksmiths curse the automobile a few years ago. I never felt that way about it for I would rather work on an automobile than shoe a horse most any time.

"As to ruining the blacksmith business the blacksmiths should have seen the change coming and prepared themselves to meet it for we, like everyone else have to keep up with the times or else take a back seat."

The foregoing letter came to us from a blacksmith located in a California town of between 200 and 300 population.

YOUR OPPORTUNITY TO SERVE YOUR COUNTRY AND HELP WIN THE WAR.

Civilian Workers Wanted for Ordnance Department. Special Training for Those Not Experts.

Men having a high school education, some shop training and the natural ability to adapt themselves to new work, may qualify for a Government appointment in which, under Government instructors, they will receive the necessary training for the positions described below. Those who have the required technical training will be placed and advanced as quickly as their ability justifies.

Which one of these jobs suits you?

Inspectors and Assistant Inspectors, Field Artillery Ammunition Steel, Inspectors Artillery Ammunition, Cartridge Cases, Assembling, Loading, Forging, Primers, Detonators, Shell and Shrapnel Machining; Ballistic Inspectors, Metallurgical Chemists and Assistants; Inspectors, Powder and Explosives; Inspectors, Cannon, Forging Operations; Inspectors, Gun Carriages and Parts; Inspectors, Gun Fire Control Instruments; Asst. Inspectors, Motor Vehicles and Artillery Wheels; Engineers and Asst. Engineers, for tests of Ordnance Materials; Inspectors, Ammunition Packing Boxes; Machinists, accustomed to work to 1000's of inch.

Send in your own application and urge your associates who may be qualified to do so. These positions are under civil service regulations, but applicants will not be required to report for examination at any place. Applicant will be rated in accordance with education and general experience. No applications will be accepted from persons already in the Government service unless accompanied by the written assent of the head of the concern by which the applicant is employed. Papers will be rated promptly and certification made with least possible delay. Apply or write for further information to C. V. Meserole, Special Representative of the Ordnance Dept., U. S. A., Room 800, 79 Wall St., New York City.

Fireproof Plastic for Welding Spur Gears—Will some welder please tell how he uses fire proof plastic and the plastic binder. What kind of jobs do they use it on?

Would it not be of great help on cog wheel work?

I am having some acetylene welding to do and anything on that subject will be of interest to me.

Louis Ferrell, Missouri.

In Reply—Fireproof Plastic Binder or a mixture of Asbestos Fibre Cement and plaster of paris in about equal parts, can be used for backing up delicate or thin aluminum castings that are to be welded

with the oxy-acetylene welding torch. In fact it is a great help in welding any small casting of brass, bronze or aluminum.

In the welding of gear teeth where the entire tooth has to be built up it is better not to use a backing as the metal cools too quickly to insure a good weld to the gear rim and at the same time make a tooth free of blow holes or cold shuts.

With the gear well pre-heated and as it remains in the heating fire, build up the tooth as near correct as possible and then smooth it up with the torch and after it has cooled (very slowly, of course), grind and dress off as desired.

If one must use something to protect the teeth next to the one being welded, it is best to use a piece of carbon fitted to the desired shape with a rasp. These carbons can be obtained from old dry batteries and will be found very useful on the welding bench.

Regarding the fireproof binder or asbestos, it will be found that they will set very quickly and to any desired shape,—however, they will not stand the direct flame of the torch.

S. S., New York.

From a Charter Reader—I have read every copy of The American Blacksmith from Volume I, Number I on down to this date and it gets better every year. You are doing a great service. I have been an anvil ringer for 33 years and I have always been proud of my trade.

I have a new shop, well equipped with up-to-date tools and do a good business and get good prices for all I do.

This is an irrigated country on the Platte Valley and it is as fine as you can find anywhere. Blacksmiths are scarce here as none of the younger men are learning the trade.

J. N. Keeney, Nebraska.

Shoeing for Ringbone—Circumstances caused me to advertise for a man last summer and I hired a tramp who had been almost everywhere and had worked for some good men, as I knew as soon as I saw him work as he had most of the tricks I use in shoeing and he had one that I never heard of until I saw it in an article by Mr. Camp in our magazine. That was a shoe to help a horse with ring bone. He fitted one up exactly as Mr. Camp said in his article and it worked fine, so much so that the man will have no others. I have worked fifty years myself, have been around some, read a lot, but that was really the first time I ever saw a man help a horse by shoeing for ring bone. A horse with a ring bone must go lame because he cannot use his foot as Nature intended he should, but I contend that while a horse goes lame it is not always a sure sign that it causes him pain.

I am a strong believer in shoeing to correct what I call "objections" in a horse that does the things he desires to do or that Nature has put into his foot that makes him go wrong.

Now, my theory is right as far as the shoer has brains and skill enough to tell him how the horse should go. If I were personally doing my own shoeing I would surely use one of Mr. Camp's ideas that he brought out in one of his articles and that was; to set your shoe by the leg and not by the foot. This appealed to my common sense, but I cannot do it personally and it is extremely hard for me to make some other man's hands perform what is in my mind.

E. H. Maloon, New Hampshire.

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BUFFALO, N. Y.

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Cable Address: "Blacksmith, Buffalo"

A PREDICTION

The tractor industry will, one of these days not very far removed, occupy the same position that the automobile industry holds today.

Manufacturers of tractors are behind in their orders, although this condition is aggravated somewhat by the inability to secure raw materials. Nevertheless American industry is having difficulty in making the output keep up with the demand.

As an indication of what the tractor industry is coming to Henry Ford has announced that he will eventually employ 100,000 men—no, this is not a "typographical error"—One hundred thousand men in the manufacture of Tractors alone. That is several times more men than he had prior to this country's entry into the war building automobiles.

Here is what he thinks of the tractor industry:

"The tractor industry is bound to become one of the leading industries of the world and we are making our plans accordingly. I plan on devoting most of my time to the building of tractors. The tractor is and always has been my pet hobby. It is something that will do much toward the betterment of mankind, and that is what I am largely interested in."

Now is the time when wise men are going to clamber aboard the band wagon without any coaxing and the years that are to come will prove to them that they have not been mistaken in their choice.

EVERYBODY'S DOIN' IT

"Joshua Burdick has recently bought a motor truck which he intends to use in drawing milk from here to Akron each day. He has drawn milk for several years with horses."

Buffalo News.

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Don't give money to agents unless you are sure who they are. Every authorized AMERICAN BLACKSMITH agent will gladly show you his letter of authority to take your order. When in doubt, send money and order direct to Buffalo, N. Y.

"NO ADMITTANCE"

This is the sign that locks you out. It tells you to keep away, that you are not wanted.

The sign is alright on a door but not on a face. Many men carry this sign on their faces. They look as though they didn't want you to talk to them, to do business with them, that they didn't want you near them.

It pays to carry a cheerful face, to look pleasant, to look human.

We like the man who smiles, who is sunny and who has a pleasant way of greeting a customer.

Cultivate an inviting countenance. Don't have people fear you or be afraid of you.

Merchants have lost business by giving the impression that they are cold, grouchy or indifferent.

How often do you hear the expression "I don't like to do business with that store." As a rule there isn't any vital reason back of that statement, except the impression given as described here.

It is the politician's first duty to be on speaking terms and pleasant with everybody.

It is a good rule for business men to follow too.

You win trust this way, and people who trust you will do business with you

BERLIN PAPERS, PLEASE COPY

Sorry I overlooked the matter of my renewal but have been busy fixing up implements so we can lick the Kaiser. Perhaps before this year's subscription runs out I may be in the shipyards as I am a little too old to soldier. If I should, I hope the good old paper will be able to follow me.

N. R. SWOPE,

Missouri.

P. S. Have bought Liberty Bond No. 3.



FINE EXAMPLE OF NORMAN WROUGHT IRON WORK ON THE DOOR OF WOKING CHURCH

The Automobile Cooling System

J. L. HAKY

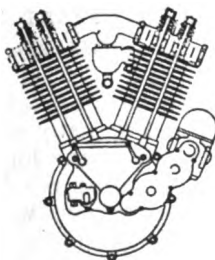


THAT the cooling system is a very necessary evil can be judged from the fact that thirty-five per cent. of the power generated in the cylinders is dissipated through the cooling water. If it were not for the fact that oil breaks down and burns at high heat, we could get along very nicely without any cooling system, save a third of the engine power that now goes to waste and reduce the weight and complexity of the automobile power plant besides materially reducing the cost and the care of looking after it.

However, lubrication is absolutely essential to the internal combustion engine and to maintain the oil film between the various moving parts we have the cooling system.

At the present time there are two distinct methods of cooling the engine, one employing water and the other air. In the air cooled engine the heat is dissipated through fins projecting out from the cylinder. In the water cooled system the water is kept in constant circulation in the water jacket around the cylinder. This system includes a fan, radiator and in most cases now-a-days, a circulating pump, to assure positive circulation.

The Franklin automobile is the oldest and most familiar type of car employing the air cooling system but the cylinders are small and the air cooling in this engine is assisted by using auxiliary exhaust valves which allows the exhaust heat to pass more quickly.



THE MOTORCYCLE HAS A TYPICAL AIR COOLING SYSTEM

Air cooled engines generally have small cylinders and operate at high speed to develop their full power. Because of the fact that the temperature cannot be held as with engines of the water cooled type they cannot

be built or operated on high compression as there is danger of pre-ignition.

In operation the water circulates around the cylinders and then goes to the top of the radiator and then flows down to the bottom through tubes or cells, giving off the most of its heat on the way. The fan draws air through the openings in the radiator and this assists in removing the heat from the water. Without the fan a much greater radiator area would be required than would be practicable to use on the passenger car.

There are two commonly used methods of water cooling — the thermo-syphon and the pump system.

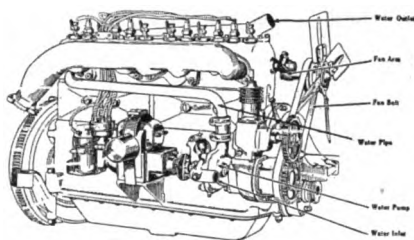


FIG. 2—THE PRINCIPAL PARTS OF A PUMP SYSTEM ARE SHOWN INSTALLED ON A SIX CYLINDER CONTINENTAL MOTOR

The thermo-syphon system is sometimes referred to as the "natural" method. No pump is used in this system, the movement of the water being assured by the natural law that heated water is lighter than cold and consequently rises to the top.

Figure 1 shows how the thermo-syphon system operates, the path of the heated water being indicated by the arrows going toward the top of the radiator. The letters A and B show the water spaces surrounding the cylinders. C is the water pipe, usually of brass or aluminum, D is the rubber hose connection, E is the radiator core and F is the water tank or upper header as it is often called.

In this system as soon as the engine starts, the water in the jackets gets hot, rising to the top and displacing the cooler water which rushes in to take its place. In this way the hot water pushing its way

to the top and the cooler water rushing in to take its place, starts a circulation of the water sufficient to keep the engine properly cooled. It is necessary in the thermo-syphon system that the water pipes be of generous size. The thermo-syphon system is the simplest method of cooling the engine and when properly designed is effective for ordinary service. It has not the positive action of the pump system but it does very well, but when the engine is subjected to hard service like climbing long hills or pulling through hard roads the water is more likely to boil. However, for small engines this system works very well.

In the pump system a centrifugal pump driven by the engine forces the water through the system and maintains a constant and positive circulation. So long as the engine is running the pump must force a flow of water through the system and naturally the pump system is more expensive than the thermo-syphon system.

Figure 2 shows the location and the principal parts of a pump system as applied to a Continental six cylinder motor and Figure 3 shows the path taken by the water in its course through the system.

The radiator member of the cooling unit has a tank at the top and

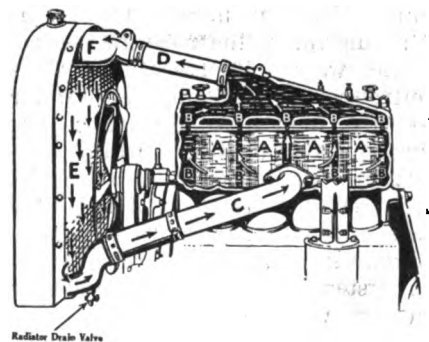


FIG. 1—THE PATH OF THE WATER IN THE THERMO-SYPHON SYSTEM

another at the bottom, called in shop talk the upper and lower headers. The radiator "core" is the section lying between the two tanks which looks like a honeycomb. There are two separate types of radiator cores — cellular and tubular, some ex-

amples of which are illustrated in Figure 4. In operation the water enters the tank at the top of the radiator where it is "baffled" so that

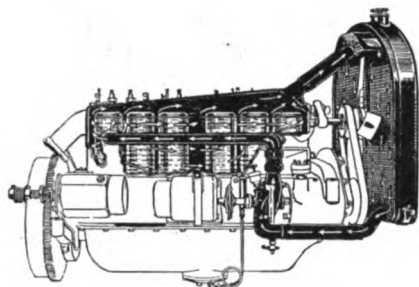


FIG. 3—THE ARROWS INDICATE THE JOURNEY THE WATER TAKES IN THE PUMP SYSTEM

instead of flowing down one side of the core, it is distributed all over the cooling area. The lower tank receives the water from all parts of the core.

Few persons realize that the shape of the radiator has anything to do with the efficiency of the cooling system. It has, however. The high, narrow radiator, such as is used on racing cars, gives the water a greater distance to travel downward through the core and consequently more time to get rid of its heat, and all water is exposed to the fan draught. It used to happen quite often that too small a radiator was fitted to the ordinary car and overheating troubles would develop, but in present day cars the radiators are generally entirely efficient for the work they have to do.

While it is necessary to cool the engine, as has been explained, it is not good to cool it too much. There is a certain point of maximum efficiency and within the last two years engineers have been learning much as to the best method of maintaining the engine's temperature at just this point. The principal means of attaining this is thermostatic control of the water's temperature. This control means the fitting in the water line of a device which shuts off the flow of water until a certain temperature is reached, when it permits the circulation to proceed until the water is cooled enough, when the flow is again interrupted. A variation of this system is found in the radiator shutters, which are found on some of the higher priced cars. These shutters shut off the air current through the radiator until the maximum safety point in temperature has been reached. The radiator is operated by a thermostat.

The principal causes of overheating in water cooled engines are: insufficient water in radiator, constrict-

Cooling System Pointers

The blades of some fans have the habit of working loose on account of defective riveting at the hubs. For this reason a new fan should be carefully watched for a time. A loose blade can do a good deal of damage to the radiator when it breaks. A great many radiators are severely damaged from this cause.

Where a pump is utilized to circulate water, it is advisable to fill the radiator and then run the engine to insure the water reaching and filling all parts of the system. When the motor is not run, the pump becomes an obstruction to the passage of the water, and quite often one believes the circulating system to be filled when it really is not.

The radiator hose connections should be frequently inspected. Quite often these look good from the outside but they are defective on the inside. When the walls of the hose become decayed they have a tendency to swell and close, thereby preventing proper circulation.

When a radiator leaks it is not advisable to use material to stop the leaks from the inside. Such foreign matter has a tendency to clog the radiator and cause overheating. A temporary repair can usually be made from the outside, and then at the first opportunity a permanent repair should be made.

Care should be exercised not to use hard water in the cooling system. Water containing minerals will cause a scale to form on the inner walls of the whole cooling system and eventually induce overheating. Soft water is best to use.

ed openings in gaskets, frayed hose connections, collapsed hose connections, scale deposits in radiator, mud clogging the radiator openings, water frozen at bottom of radiator, broken fan belt, loose or slipping fan belt, improperly bent fan blades, broken pump shaft, lost pins on pump shaft coupling, pump shaft gear or internal pump mechanism and shearing off of the pin holding the pump shaft.

The foregoing are the principal causes of engine overheating that are directly caused by the cooling sys-

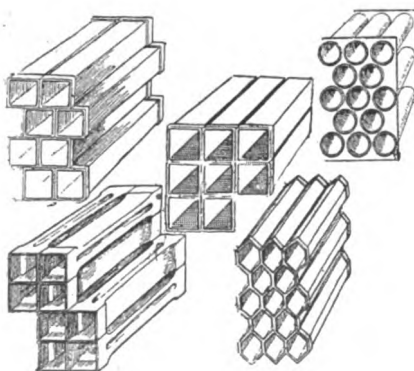


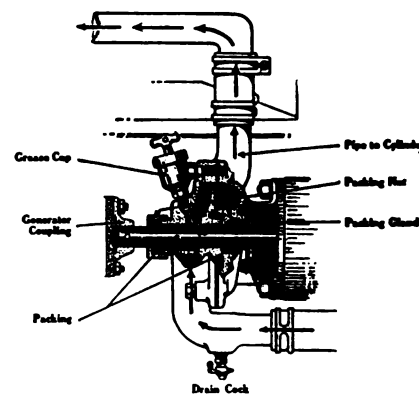
FIG. 4—COMMON TYPES OF CELLULAR RADIATOR CONSTRUCTION

tem. Other causes of overheating are insufficient lubricating oil, or a poor grade of oil; operating with too rich a gasoline mixture and on retarded spark; improper valve setting, pre-ignition, lack of compression, using oil too long without replacing with fresh.

If the car is not to be used during the winter every drop of water should be drained from the cooling system and if the car is to remain in service during the winter the temperature of the water must not be allowed to fall below freezing or bursted radiators and cylinder castings will inevitably result.

Should small leaks develop in the radiator it is not advised to use any of the various radiator cements or other preparations that are mixed into the cooling water as this material will sooner or later have a tendency to cause trouble. For small leaks in the radiator, a small piece of chewing gum is about as good as anything for the purpose but wherever possible the leaks should be closed by soldering.

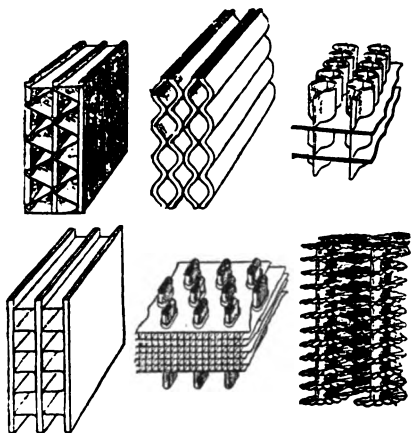
At the first indications of overheating look to the fan belt as a loose and slipping fan belt is the most common cause. Fan belts are



THE IMPORTANT PARTS OF THE WATER PUMP

usually made of leather or woven fabric but many car makers, particularly of the higher priced cars are providing the fan with a noiseless chain drive which insures positive operation of the fan. Should the fan be found O. K. it is then more than likely that the radiator either needs filling or that the radiator is badly clogged with scale or other foreign matter.

An automobile is no more a "pleasure car" than your feet are "pleasure feet." The automobile business is now the third largest industry. Refer to automobiles as "passenger cars."



SOME COMMON STYLES OF TUBULAR RADIATOR CONSTRUCTION

DISGUIISING THE FORD—IT CAN'T BE DONE

A short time ago owners of Ford cars were lying awake nights trying to figure out some scheme to disguise their Fords to such an extent that they would look like a "regular" automobile.

Here are a few gems from an advertisement that appeared in 1916:

"A Ford car disguised by means of the Dingbat stream line hood with radiator shell and crown fender.

"The Ford with the ugliness eliminated and the 'tin can' appearance 'canned.' Look again at the picture. How different from the Ford of the funny book! The sturdy little engine is still chugging away under that stream line hood and the efficient Ford radiator is still on the job—but you can't see the familiar kite shaped brass frame."—CAMOUFLAGE!

The whole outfit was stamped from sheet iron and slipped or bolted over the Ford at the proper places.

Then along came an accessory manufacturer with a scheme worth a million. His idea was to use some sort of a screen for the back end of the car that completely concealed the rear axle; which is always a dead give away no matter how effectively the camouflage was applied.

But the crowning disappointment of a misspent life is to spend a lot of time and money disguising your Ford and then have some friend get a slant at your camouflaged mechanical cockroach and then innocently remark—"Say, Bill, haven't you done something to your Ford?"



No Wonder the Car Owner Kicks

"OLD TIMES"

Recently I found that I had ten days of enforced idleness on my hands and I spent a part of it in visiting the shops in our town. From some of the things I saw done I can thoroughly understand why more than one car owner's "kick" is thoroughly justifiable.

The following instances are only a few of the ones that I came across and serve to show the class of "skilled" labor that is employed in some automobile repair shops. Read these few instances and then you will begin to understand why the automobile owner "has it in" for some repair shop in his neighborhood.

In one place two men were at work on a practically new car. One man was scraping the carbon from the pistons and another was taking up the connecting rods. In some manner the man working on the connecting rods pushed a piston up until the first piston ring was above

when it started. The owner drove the car for about three miles and burned out all of his connecting rod bearings and one of his main bearings and then didn't know what was the cause of the trouble.

A third instance was a "repair" job on an \$1,100 car with a broken torsion tube. When the tube was replaced the repairman left out the rear roller bearing. The result of this was that the drive shaft had all kinds of play. The roads being good the car took him home all right but on his next trip to town the mud and snow were bad and the car had a hard pull. The result of this error was that the play in the drive shaft pulled the differential to pieces and a new one cost the owner \$35.

One case came to my notice at another place. A man paid \$20 for a set of patent piston rings for his eight cylinder machine and took the car to the shop to have the rings put in. The repairman put in six out of the sixteen rings and then put the remainder into one of the shop cars.

Another fine example of "bone-head" repairmen is illustrated in this case.

A six cylinder car, having lost a part of its power and some of its compression was taken to a shop to have the complaint remedied. After \$14 worth of time had been spent on it the car was returned to the owner in the same condition it was in when brought to the shop. The owner tried another man. This one knew his business. He removed the cylinder head and found that the front piston had the whole top broken in and the pieces were in the bottom of the crank case. A new piston at \$4 and \$6 worth of time restored the car to its original power.



WELDING GAS LINE JOINTS SHOWS BIG ECONOMY. THIS SHOWS A 14-INCH LINE BEING WELDED

the top of the cylinder. Number 1 tried to get the piston back in the cylinder but was in too much of a hurry. He took a block of wood and a hammer and *drove* the piston down, shearing off the ring and a part of the piston. The other man working on the bearings finished his job and the oil base, gasket and cylinder head were replaced and the job marked "O. K." I have often wondered what that car owner will say when he sees what he has paid a dollar an hour for.

In another case a bearing job on a Ford was turned out of the shop without the oil base having been bolted up tight, so that oil was leaking

TRACTOR VS. HORSE

An up-to-date tractor with a weight of a ton and a half will pull three 14-inch plows at a depth of seven to eight inches at a speed of about two and one-half miles per hour. In one mile there are 5,280 lineal feet. One bottom turning 14 inches of soil in cutting one mile will turn 6,160 square feet. At the speed of two and one-half miles per hour, the amount of ground turned by one plow in one hour will be 15,400 square feet, .35 of an acre, or at the rate of three and one-half acres per day. Using three plows, one man would be able to plow 10½ acres per day.

Adjusting the Steering Gear

F. C. MACDONALD

AFTER the car has been in use for a year or so there begins to make themselves seen and heard in various ways sundry strange noises and loose parts that were foreign to the car when it emerged from the factory resplendent in its shining finish.

It usually takes considerable use before the steering gear begins to show signs of wear and the car will have probably traveled several thousand miles before any readjustment will be made necessary, and the need of this readjustment will make itself felt to the driver in several ways, principally by unnecessary looseness and difficulty in steering.

To relieve the driver of some of the strain incident to driving over rough or rutted roads, a little looseness of the steering wheel rim is advisable and every car sent from the factory has from an inch and a half to two inches of free travel. However, any play that interferes with the positive operation of the car is undesirable as well as unsafe and tiresome to the operator.

Wear of the steering mechanism is unavoidable as it is at all times in use when the car is running and con-

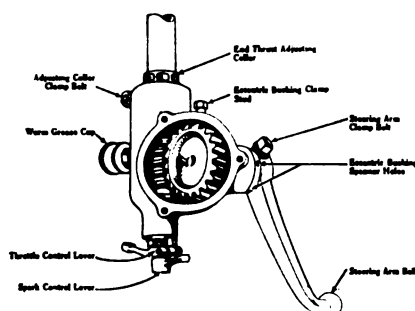


FIGURE 1 IN WHICH IS SHOWN THE "INNARDS" OF THE STEERING GEAR

siderable work is being performed by it at all times in keeping the front wheels in the desired direction.

It will be found that the steering gear in all cars is practically the same and the directions for taking up wear will apply to most of the better class of cars.

To correct wear or lost motion in the steering gear, first loosen the clamp bolt that clamps the end thrust adjusting collar and turn the notched end thrust adjusting collar, shown in Figures 1 and 2 to the right. This action forces the shoulder on the column closer to the thrust bearings.

Next turn the steering wheel to the extent of its travel in either direction, and after loosening the nut

on the eccentric bushing clamp stud shown in Figure 1, turn the eccentric bushing until all lost motion between the worm and the worm wheel has been taken up. There are holes or slots in the eccentric bushing for turning it after the clamping device has been loosened up. After this

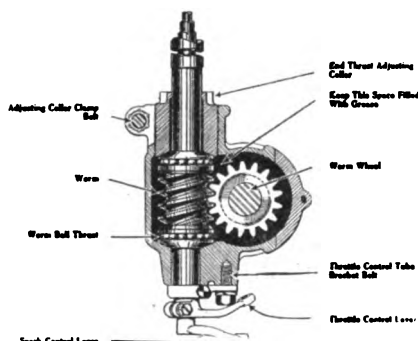


FIGURE 2 WILL GIVE YOU A CLEARER IDEA OF THE STEERING MECHANISM

adjustment has been made, clamp the bushing tightly in its place again. It is advisable to make this adjustment with the wheel turned to the extreme position because of the fact that the most wear occurs on the worm wheel in its position when the car is being driven straight ahead. If it were so adjusted that no motion were present at this point in its travel, it would be impossible to turn the wheel very far in either direction without its binding excessively.

If any of the foregoing methods fail to remove the lost motion, or backlash, as it is often called, we have still another remedy. Remove the steering gear by disconnecting all the spark and throttle controls, dash brackets, etc. Then take off the steering arm shown in Figure 2 and turn the square shaft so that it will make a quarter turn. Then the steering arm is replaced. This operation brings a new surface of the worm and wheel into engagement and takes up the play. The eccentric bushing should be turned back so that it can take up the play in the usual manner, after the steering arm has been changed.

BOSCH'S ARE BOCHES

The plants of the Bosch Magneto Co. in this country have been taken over by the United States Government because they are owned by aliens. The Government announces that in future the output of the Bosch factories will be used to make supplies for war purposes.

THINGS ELECTRICAL

Bear in mind that the fumes from a storage battery on charge are inflammable and that it is not safe to bring a naked flame near a cell that is "gassing" freely. Battery repair shops and charging stations are usually careful in this respect, knowing by practical experience that the gas can be ignited.

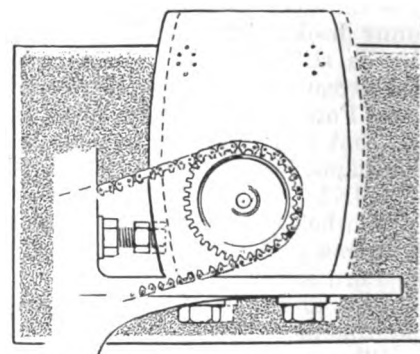
Most self starting systems have a fuse box installed at an accessible point. Very often considerable trouble in the electrical system can be eliminated by the installation of a new fuse. This is a simple matter, but if not known may cause a lot of trouble and unnecessary work and expense.

When the electric current short circuits through the core of the spark plug it's a "cinch" that the core is cracked. Often the core of the spark plug is broken by careless handling when tightening it into the cylinder.

TIGHTENING GENERATOR CHAINS

It sometimes happens that the repairman is called on to take up some slack in the chain that drives the lighting generator.

On most cars the generator is bolt-



TIGHTENING THE GENERATOR CHAIN

ed to the bracket in such a manner that it can be moved back and forth, as shown by the dotted lines, by loosening the bolts holding the generator to its base. An adjusting bolt, with a lock nut, that can be turned in or out as desired against the generator housing gives the desired adjustment of the chain.

If you know your work is rightly priced you should lose no sleep over your competitor's lower prices. If he is selling exactly the same goods and the same service you are selling at a lower price, he is headed straight for the rocks. Don't cut your own throat to keep him company.

AT LAST—A FORD "TANK!"

The large British tank which is being taken over the country by the British-Canadian Army to create interest and do its bit toward getting recruits, was left standing on the street in Springfield, Massachusetts, while the officers in charge went to lunch. When they returned they found that the tank—known as "Miss Britannia"—had a little colt toddling by its side. The colt was vigorous and frisky and very imitative. It insisted in doing everything its mamma did in the way of going over obstructions and in and out of difficult places.

The colt turned out to be the experimental Ford "two-man tank" which its inventor, C. H. Martin, had brought into public view for the first time, with the idea of comparing its performance with that of its big English mother and to see if there was anything in the big one to offer a suggestion whereby the baby tank could be improved. Mr. Martin is satisfied that the small machine will go any place the big one will go and many places where the big one won't go, and is much faster. The Ford had the ordinary runabout body so the method of armoring was not disclosed.

REMOVING OBJECTS FROM FORD TRANSMISSION CASE

A simple way to remove small objects from the Ford transmission case is to lift the top half of the case (not the cover plate) and tie a cloth or rag to a magnet on flywheel, of sufficient size to take up all the space between flywheel and case, then turn engine over and the cloth will bring up the object. Should it be necessary to turn the engine backward, throw it in gear, jack up a rear wheel and turn same.



THE "TANK" BRITANNIA IS KNOWN AS A "FEMALE" TANK HENCE IT FOLLOWS THAT THE FLIVVER MUST BE A COLT

Re-Lining the Brakes

A. C. JORDAN

ASIDE from the engine the brakes are possibly the most important part of the whole automobile mechanism. The safety of the occupants depends in large degree on the proper functioning of the brakes when needed and they should be kept in the best possible condition. They should not bind too tight when engaged nor drag when the brakes are released, for a set of "dragging" brakes will cause the car to run hard.

There are a number of excellent brake lining materials on the market known under various trade names. These linings are composed of asbestos fabric into which is woven fine copper wires. Another popular lining is composed of the usual asbestos fabric into which is placed cork inserts. The choice of the lining to be used is a matter of preference to either the repairman or the car owner. There is not a great deal to choose between any of the different linings on the market as they are all of about the same quality and price.

The various sizes of linings are generally measured in width and thickness and sold by the length per foot. Linings vary in thickness from 3/32, 1/4, 3/16 and 5/16 inch and one inch to six inches in width. The proper lining for the Ford brakes is 3/16 inch thick and 1 1/8 inches wide and sells around 40 cents a foot for the standard brands.

The first thing to be done will be to remove the rear wheels and right here is where you want to practice a little of the Safety First "dope" you have been reading about. Jack

the car up but provide some SOLID support for it before you remove the wheels, preferably a strong wooden horse or several heavy wooden blocks. A jack or a wheelbarrow will more than likely slip and let the car down on you and it isn't worth the chance for if you do escape injury damage will likely result to the car. However that's up to you.

If the lining is merely worn down flush with the rivets it is possible in some cases to avoid relining by setting the rivets a little deeper so that the heads will come below the surface of the fabric. Where the lining is badly worn or torn it should be replaced and this should always be done rather than to attempt the makeshift of tightening the rivets.

The fabric should be first loosened up by prying between the old lining and the brake, the brake is then placed in the vise and the rivets chopped off with a cold chisel and knocked out with a punch.

The next step will be to obtain the correct measurements for the lining; thickness, width and length of the material needed. The width of the lining should correspond with the width of the internal and external bands while the length can be ascer-



tained by measuring the old lining or by measuring around the brake itself, making the lining long enough to allow for a quarter of an inch

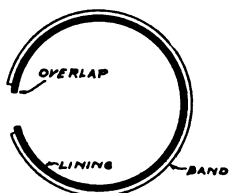
overlap at the band opening. The rivet holes are generally placed very close to the ends of the brakes and this additional quarter of an inch is to prevent the lining from pulling loose from the end rivets. The internal brake band will usually work out about an inch shorter. In cars where brake shoes are used for the internal brakes, for example, the Ford and Overland models, the same allowance for overlap should be made.

After having found the proper lining to use and having cut it to the proper length, it should be fitted to the brakes and the rivet holes marked. In some cases it will be found possible to line up the holes and drill them at the same time with an ordinary brace and drill but in most cases it will be found that the holes will have to be marked with a piece of soapstone or chalk and then punched out with a harness punch

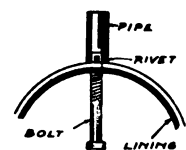
and pains should be taken to punch these holes accurately enough to insure their lining up with the holes in the brakes as this is one of the secrets of a finished piece of work.

After the rivet holes have been located and punched they should be countersunk so that the rivet head will be at least a sixteenth of an inch below the surface of the fabric. The holes can be countersunk by using an ordinary sharp wood countersinking tool or regular rivet countersinks for this particular purpose can be obtained from the supply houses for about fifty cents each. These countersinks generally come in sets of three, for the various styles of rivets but they can be bought separately. To get the best results the countersinks should be kept sharp, as a dull tool will have a tendency to tear the fabric. The holes should not be countersunk too deeply,—just enough to keep the rivet heads below the surface of the fabric.

When all the work incident to locating, punching and countersinking the holes has been done, the lining should be placed on the brakes and fastened with small bolts and nuts. This will hold the lining in the proper position and will also assist greatly in doing the riveting. Remove the bolts one at a time as the rivets are put in. The object in doing this is to prevent the lining from cutting the corners, as shown in the illustration, and which would



THIS SHOWS HOW THE LINING SHOULD FIT

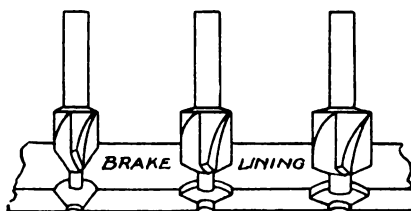


DRAWING THE RIVET. SNUG WITH A PIECE OF PIPE

result in a very unsatisfactory, if not absolutely worthless piece of work. This will apply only to the lining of the external or contracting brake bands, this trouble not being encountered in lining the

internal, or expanding brakes. In locating the holes on the brake shoes and bands for the internal brakes, the two end holes are punched first and the lining bolted down in the manner mentioned. The holes opposite the split in the band are next punched and bolted and following the same plan with the last two holes will complete the temporary attachment and prepare the lining for riveting.

A vise will be found to be almost indispensable to a good job of riveting. An old bolt head in the vise with the head of the bolt resting on the arm of the vise to give a solid foundation will answer very well for a support for the rivet while it is being "upset." Place a rivet through the lining and the brake with the head on the inside and draw the rivet up snugly with a piece of gas pipe or some similar hollow instrument, as shown, and then two or three blows of the hammer will be sufficient to upset the rivet enough to hold tightly. Too much hammering on the rivet will have a tendency to draw the rivet deeper into the lining and will at least weaken the lining at that point if it does not tear through entirely. The rivets should not come through the lining and the brake for more than about 3/16 inch. After the brakes have been relined and replaced on the car it is more than likely that some re-



SET OF BRAKE LINING COUNTERSINKS FOR THREE DIFFERENT STYLES OF RIVETS

adjustment will be found necessary to prevent "dragging." All cars have some means of adjusting.

The rear end of the car should be jacked up and the engine running and driving the wheels. Then have some one apply the brakes and see if both wheels stop at the same time, which is necessary, otherwise the car will show a tendency to skid should the brakes be applied in service.

Some cars are fitted with brakes in which the adjustments are made by varying the position of the brake operating lever and the clevis on the brake shaft. Usually there is a hand adjustment on the external, or contracting brake, as shown.

On some cars that are not provided with equalizers the brake rod adjustments are made by lengthening or shortening the rods by screwing on or off the yoke ends which connect with the brake levers.

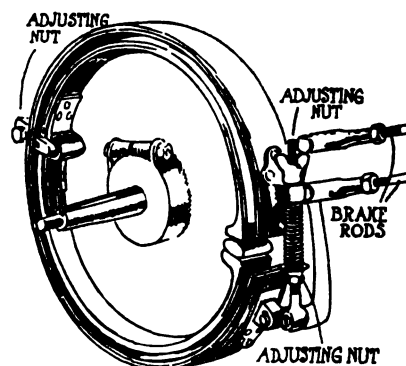
If grease or oil works into the brakes it is an indication that the felt washers on the axles have been worn out or that too much grease is being carried in the differential. The cure for this is obviously enough, new felt washers.



On January 1, 1918, New York state had 404,000 motor vehicles registered. Iowa and Nebraska are tied for the lead in cars per unit of population, with a motor vehicle for every eight residents.

HOLDING BOLT HEADS

To keep the head of a bolt from turning in the clamping grooves of a planer, miller, or other shop machine, on which machine parts are bolted down while in process, take a washer of the same size hole as the bolt diameter, and turn over two opposite edges of it so that the head of the bolt fits between them. Then slip the washer under the head of the



SHOWING THE BRAKE ADJUSTING SCREWS

bolt, so that it rests in the clamping groove, almost as a part of the bolt head. This takes up the looseness.

SAVING

If you want to be different from the common run, save some money every month, accumulate a small fortune by the time you are ready to quit work, and get yourself in such financial condition that you won't become a dependent upon somebody, or some society by the time you are sixty-five.

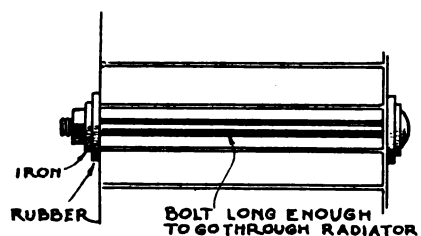
REPAIRING RADIATOR LEAKS—2

HONEYCOMB radiators are somewhat more susceptible to leaks than are radiators of the tubular variety for the metal is rather thin. Further, it is not always possible to have the leak soldered up at the time it develops and there are some instances where even the repairman is not in a position to solder a leak of this sort, either for want of apparatus or from the nature of the leak.

An emergency repair for a leaky radiator is quickly made and attached and although similar devices for the same purpose but along somewhat different lines are on the market, they are not always to be had when needed.

By using a long, thin bolt, that can be made with little or no trouble if it is not in stock, and making it long enough to pass through the radiator, two small flat washers and two rubber washers on each side of the radiator will do the trick.

Leaks over a considerable area of the radiator can be fixed in this manner, as an emergency repair, by using a piece of fairly heavy sheet metal with one or two thicknesses of old inner tube between. Of course this



AN EMERGENCY REPAIR FOR SMALL RADIATOR LEAKS

will make a more or less ragged looking repair and the water will probably boil if the area covered in this manner is large. However, the car owner will be able to keep on his way.

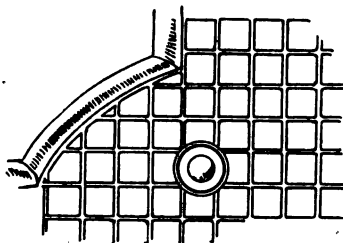
A small box of white lead is a good thing to keep around the shop as very small leaks can be stopped up with this. Electrician's insulating tape is also a mighty handy thing to have around as its uses in the repair shop are legion, and radiator leaks can quite often be repaired with tape.

Leaks in the tank or radiator can sometimes be stopped by hammering but this is not advisable as the radiator water tank is rather brittle in some cases and more damage is likely to result.

Whenever it is possible to obtain rain water for the engine it should

be used, as it lacks the minerals that form scale in the radiators and water jackets and which sooner or later will give trouble.

The radiator is a hard thing to paint, as anyone who has tried it, has learned from experience. If it is not possible to "dip" the whole radiator, and this is seldom possible in the small shop, one of the hand spray pumps that are used for spraying plants or stock can be used for the purpose with satisfactory results



THE REPAIR IN PLACE

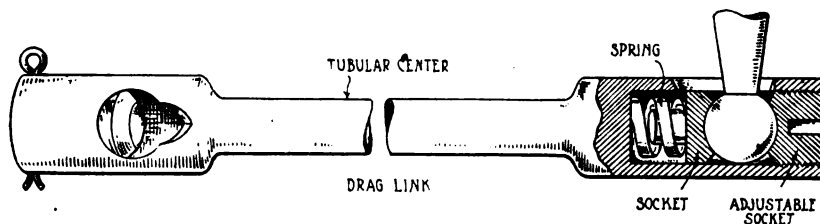
if the paint to be used is not too thick and even a fairly heavy paint can be used if a sufficient air pressure is obtainable. A tire valve can be soldered to the spray and the paint can be sprayed onto the radiator far quicker and more evenly than could be done by hand.

CARING FOR THE DRAG LINK

Much depends on the proper working of the drag link for defects are likely to result in accidents that are usually blamed on "defective steering gear."

It is a good plan to remove the drag link once a year, at least, for a good cleaning and inspection. Once in a great while it will be found that one or both of the springs that hold the socket firmly to the ball arms are broken and new ones should be placed immediately.

Adjustments are made by screw-



THE CONDITION OF THE DRAG-LINK SHOULD BE LOOKED AFTER OCCASIONALLY—IT PAYS

ing in the slotted socket nut. Under no circumstances fail to line up the slot in this nut with the cotter pin hole and replace the cotter pin.

A screw driver made in the shape of a "T" and about five or six inches long will be found a great conven-

ience in this work as better leverage can be secured than with the ordinary screw driver.

STARTING RUSTY SCREWS

Because of exposure and weather conditions, wood screws used in the body of an automobile rust into place so that it is a difficult matter to remove them without breaking the heads. When in this condition they often may be removed by the following method: Heat a piece of iron, or soldering copper to nearly red heat and place it against the head of the screw. The heat transferred to the screw expands it, compresses the wood and when cool the screw may be removed easily, as the wood does not contract so quickly as the metal. Before replacing screws it is a good plan to coat them with either oil or soap. They may be turned into place easier and the removal if necessary at any time is facilitated.

FIFTEEN IMPORTANT TESTS OF USED CAR

In the examination of a used car the main points to be observed are here given in a nutshell:

- Test the compression.
- Examine engine suspension.
- Look for broken housings.
- Examine radiator.
- Look at gears in gearset.
- Look at bearings in gearset.
- Examine rear axle for lost motion.
- Go over steering gear.
- Measure for wheel alignment.
- Try both sets of brakes.
- Note condition of tires.
- Look over all springs.
- Try out electrical installation.
- Test the battery.
- Make general road test.

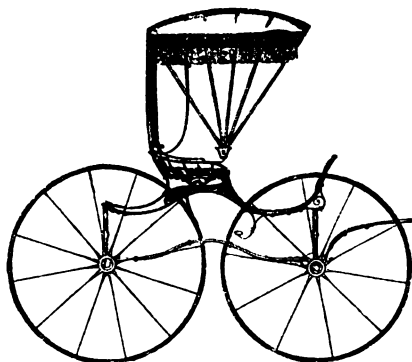
Prior to the war Great Britain ranked first, Germany second, and the United States third, as exporters of coal. At the present time the United States holds second rank.

HAVE you ever asked yourself why it is that the large shop so often looks, by comparison, so clean and systematic?

Did it ever occur that this may be one of the reasons why it is a big shop; although it does not follow that this is the reason that yours is not as large?

Those of us who have been brought up in or near small country towns realize how badly in need of cleaning up and systematizing most of the small town shops are. And then when we visit the smaller shops in the larger cities we often find that the same condition prevails.

Now, the questions I ask are,—what relation is there between the condition of a shop and its size? If



SALADEE'S "YANKEE PHAETON" OF 1856. GIVE US AN AUTO ANY DAY

the management of a shop is very careful to keep things clean and in order does it mean that that shop is any more sure of success than the shop where things are not kept clean and orderly? These questions are of great importance to all of us who have much to do with shop matters, because if there is really anything to this system stuff we want to know it. If having the shop swept up every day and putting the tools and stock in certain convenient places and keeping the cutting tools sharp and ready for use,—if doing all these things is really going to help our shop to do bigger business and so grow into a big shop then we are interested and want to know how to go about it.

Now, of course, when I first asked myself these questions I began to look around to see what was happening in real life in this connection. I found a particular instance where two shops located in the same city and doing the same kind of work had a very different experience as far as business success was concerned. One of the shops was about the dirtiest place you can imagine, thus shedding a gloomy light,—even on a

Take Your Choice

JIMINY CRICKETTS

sunny day,—on ten or a dozen excellent machine tools. Yes, they were really good tools although a casual look would not disclose this fact as it was first necessary to remove the dust, grease, dirt and metal chips that had been accumulating for weeks, months, and one could almost believe years. The toilet and wash up sinks were past describing in ordinary clean English. The manager, whom the men called "Boss," had an office that was entered direct from the sidewalk, and here we saw where the "system" of the shop began—and ended—right on the "Boss's" desk. Papers so old and dusty that they made one think of moldy cheese, were tucked in the pigeon holes,—a good name for them,—of a dirty old roll top desk. The wast paper basket at one end of the desk was full of all kinds of trash. A mouse had feasted on the remains of someone's lunch and in true rodent fashion had left the chewed up paper and crumbs strewn all around. The most conspicuous article of furniture (or convenience) was an old cuspidor standing near the wall and just out of range of the desk chair occupant, as the condition of the wall and floor bore mute and odorous testimony. The wall was covered with old train schedules, trade posters, pretty (and now dirty) girl calendars, and a number of post card signs the most conspicuous being a fly-specked one saying



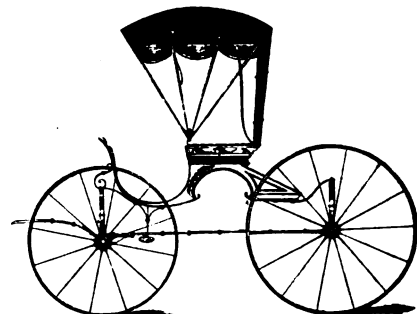
ELWOOD HAYNES BUILT THE FIRST COMMERCIALY SUCCESSFUL AUTOMOBILE. THIS IS IT

silently,—and discouragedly I suppose,—"DO IT NOW." I could go on, but why, when we all can picture the details omitted.

Is it any wonder that even the "Boss" feels depressed when he enters here? Is it any wonder that

big business hesitates to place orders in the hands of such a shop? Do you blame the best workmen for avoiding this shop when they could obtain work in a cleaner place? Was it just retribution that this shop should go into bankruptcy, as it did?

Now let us look at the brighter side of the picture. As I said before, in the same city and not many blocks



AN "ARCH BUGGY" of 1855. WE'LL TAKE A CHANCE ON THE FORD

away was a business of the same kind but, oh, so different! Here the shop was located on the second floor and the office was entered from a stairway that came directly up from the sidewalk. Do I need to describe that office? To be sure the desk was an old second hand roll top but it was clean,—had really had a bath,—and its pigeon holes had little piles of envelopes, business cards, postals and other office material, each kind seemed to have its place.

And that cuspidor, where was it? Of course it was there but it was evidently emptied every day. I at first thought that the "Boss" didn't use it, but later decided that he had "tried, practiced," and had become a perfect "shot." There was a good sized calendar over the desk that was registering the correct month. Evidently this manager did not believe in signs as the only other matter on the office walls consisted of a wrought iron pipe size table, a table of decimal equivalents, and a large blueprint of a machine this shop manufactured.

And now for the shop itself. There were not as many windows as in that other shop but you would hardly believe the difference that a clean window makes in the amount and quality of the light that gets in. Do not think that this shop is my ideal. Oh, no, but these windows had been washed within the month. Just to look at the machines made one feel that they could almost do good work all alone. In one corner of the shop was a sort of cage where they kept the tools. I learned later that one of the workmen was held responsible

for the condition of these tools. Another man had charge of the chips and shavings and other waste, which was kept in bins at the back of the shop. A young apprentice came a half-hour early each morning to "oil up" and another young man was responsible for the belts and the main and countershafts. The rough stock for any particular machine was put in boxes or neatly piled near the machine, while the finished parts were put in boxes to be carried to the fore part of the shop where the assembly work was done.

Now, Mr. Shop Man, if *you* had an important job, which shop would you trust with it? And you would be willing to pay a little more, too. And that is just what our U. S. Government thought when it gave this last shop a fine order that will keep it busy for some time to come. No bankruptcy there.

It will PAY YOU and me to look around our shops these busy days. Let's dig out the corners, sell all scrap metals, etc., sharpen our tools, and thus HELP UNCLE SAM WIN THIS WAR.

TEMPER COLORS OF STEEL

Scarcely two authorities on the heat treatment of steel agree on the different degrees of temperature, Fahrenheit, required to equal the various colors. For instance, there are a dozen different ideas as to what constitutes "cherry red." Blacksmiths should recollect that when tempering steel the various colors are not always the same. For instance, the purple on some types of steel will be very much brighter than the same color would be on other grades of steel. A closely correct list of temper colors, and the equivalent degrees of heat (Fahr.) is given herewith, which should be of interest.

Color	Deg. Fahr.
Faint Yellow	430
Light Straw	440
Straw	460
Dark Straw	470
Brown Yellow (copper)	500
Purple	520 to 530
Dark Purple	540
Blue	550
Full Blue	560
Dark Blue	560 to 580
Pale Blue	590 to 610
Grey	620
Blue-green	630
Bright Red in dark	725
Red hot	880
Red, in daylight	1070

"Slacker" is just as applicable to men who fail to do their duty in everyday life as it is to men who shirk their duty to the government.

Care and Repair of Carburetors—1

J. N. BAGLEY

POSSIBLY few car owners realize the value of a good working carburetor and neither do they realize that some of the parts are delicate and require attention from time to time. These little parts cannot be seen and their condition must be judged from the working of the car while on the road, and as one becomes experienced with the motor

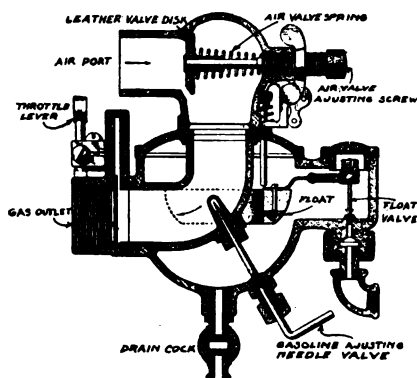


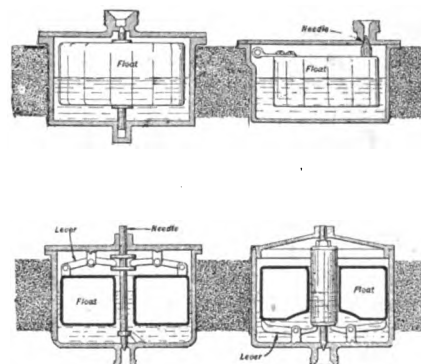
FIGURE 1 SHOWS THE WORKING PARTS OF THE CARBURETOR

car workings it will be easier to tell when some part of the carburetor is not doing its "bit." Many times some good ignition device is torn from the car and completely gone over when the trouble was in the carburetor and the reverse.

It may seem to the inexperienced that it would be absurd to tell from the action of the engine, the condition of the carburetor but nevertheless it is true and a man who understands his business can tell in a very few minutes after taking hold of the car whether or not the carburetor is working properly. A good carburetor repair man must be able to make the necessary adjustment and know when he makes it just how it will affect the running of the motor. There are so many carburetors of different makes that a man would have to be a walking encyclopedia to remember all the changes of adjustments on them. However, as most carburetors work on the same principle they vary only as to the manner of handling the mixture in getting it to the motor. The writer has talked with car owners who had the idea that the gasoline goes into the combustion chamber in a liquid just as it came from the tank, but after giving the matter a little thought they will learn that such is hardly the case. The process of carburetion is changing the liquid gasoline into a highly explosive and gaseous state. The

last stage of making the explosive mixture, after being mixed with air, is compressing it to somewhere around 300 pounds to the square inch with the piston just before it is ignited by the spark from the ignition system.

I remember quite well a case where a man brought his car to my shop one morning from a neighboring village. The car was suffering from a very acute case of carburetor trouble. He told me that he had spent a great deal of money to have the trouble remedied but without result, none of the various repairmen having done much of anything except relieve him of his cash. He had bought spark plugs enough for a dozen cars, had the magneto repointed and re-wired but still the same old trouble. After starting the engine and listening to it for a few seconds I told him that I would agree to make it work right or there would be no charge for the time I spent. This suited him and he left the car and went to breakfast. I took the car out on the road and gave it a little test. It would spit and snap until the clutch was released and finally, after it was up to speed it would not miss explosions but would drag along like a car would with the brakes partly set. I knew at once that the trouble was



SOME DIFFERENT STYLES OF METAL FLOATS USED IN SOME MAKES OF CARBURETORS

with the carburetor and proceeded to reduce the mixture by tightening the needle valve a trifle and opening the air valve. I continued to weaken the mixture and at each turn the motor began to have more freedom of action and soon it was buzzing away as though nothing had ever been wrong with it. I tried the car again and again adjusted the carburetor and in the course of twenty minutes or so I was back at the shop with the car and when the owner re-

turned for his car it was in good working order. To prove it I gave him a demonstration on some of the best hills, which was entirely satisfactory. He asked for the bill and I charged him for the time, which amounted to about an hour all told. He paid the bill and gave me a couple of dollars beside, telling me it was worth the money and that a man ought to be paid for what he knew sometimes, rather than for what he did and to a certain extent he was right.

A very rich mixture, one that contains too much gasoline, causes the motor to work sluggish and have no

carburetor has a float chamber in which the float regulates the height of gasoline that is maintained therein while there is fuel in the tank to flow to it. When sufficient gasoline has entered the float chamber the float rises and seats the float valve, thus stopping the flow of gasoline from the tank to the carburetor until the float drops again. In the illustration are shown a variety of different styles of carburetor floats that are commonly found in various makes of carburetors. The fuel from the float chamber is drawn from the float chamber through the needle valve and through the opening in

drawn through to allow the engine to run very slowly—when the throttle valve is entirely closed. By changing the air adjustment at the air valve and by regulating the fuel supply at the needle valve the correct fuel mixture for the engine can be found in a very few minutes' time.

**IF YOU HAVE NOTHING
TO DO, DON'T COME
HERE TO DO IT**

In the old days when the horse was monarch of all he surveyed the loafers hung out around the town livery stable but now all is changed and the tribe of sun dodgers has transferred their affection and allegiance to the garage, and this is especially true of the small town establishment.

The man who considers his business as worth while will not tolerate such loafers and will promptly discourage it and he need not waste any politeness in doing so. The illustration shows a sign that was put up by one garage owner that produced results.



power, that is, it will run as though the brakes were set or partly so, issuing a black smoke from the exhaust and having no speed or power. A very weak mixture, will affect the motor in just the opposite manner. It will snap and pop back through the carburetor and occasionally cause explosions in the muffler. This is due to the fact that the mixture is too "lean" to ignite and when the exhaust valve is opened the mixture is driven into the muffler. The operation is repeated again with the following cylinder and finally a quantity of gas accumulates in the muffler and is ignited by the next outgoing charge, thus the force of the explosion is likely to ruin the muffler. There are times when a set of defective spark plugs will destroy the muffler in exactly the same manner but usually one can tell in a very few seconds which is at fault and make the adjustment or replacement accordingly.

A very good way to adjust the carburetor is to start the engine and begin closing the needle valve until the mixture is so lean that it spits back through the carburetor, when it can be opened enough to stop the spitting and the adjustment at this point will be found to be very nearly correct.

As we have already found that the principles of all carburetors is about the same we will get the general working idea from Figure 1. Every

the mixing chamber by the suction of the engine pistons, which creates a partial vacuum in the carburetor. The liquid fuel leaves the mixing chamber in a fine spray and is immediately mixed with about ten times as much air and is converted into the explosive gaseous mixture that enters the cylinders.

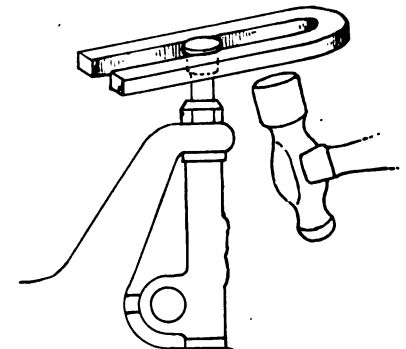
The air valve regulates the quantity of air that enters the carburetor and by varying the tension on the spring by the air valve adjusting nut a greater or less amount of air can be let into the carburetor. The spring allows this valve to be opened and governed to a great extent by the suction exerted on it by the engine at its different speeds. A carburetor with an air valve of this character is generally known as an "automatic" carburetor, regulating its own air supply without attention.

The gas outlet of the carburetor shown in the illustration is bolted to the engine casting and just behind it is located the throttle valve which is attached to the throttle control lever on the steering wheel. As this valve is opened when the engine is operating the suction of the engine becomes greater, a greater amount of fuel is drawn through the spray nozzle and the motor speeds up. Closing the throttle valve reverses this until finally the engine will stop for lack of fuel. There is, however, in most carburetors a small hole in the valve which will permit enough fuel to be

PULLING PIVOT PINS

Pulling the pivot pins from the front axle spindles isn't the easiest job in the world, even after the bolt has been unscrewed from the lower part of the axle forging.

The tool illustrated in the accompanying drawing is made of a



**PULLING PIVOT PINS
SIMPLIFIED**

12-inch length of 5/8-inch steel and bent in the middle, leaving a slightly tapering opening toward the bend. The tool is driven under the head of the bolt and blows from the hammer will speedily extract the bolt without damage to either hammer or bolt.

When using the self-starter be sure that the spark is retarded as a back-kick may wreck the mechanism. This is not necessary if the car is equipped with a magneto as the engine starts best when magneto spark is advanced.

Winning the War With Ships

Day and night shifts in every shipyard in the country are ceaselessly working on hundreds and hundreds of steel and wooden ships that will play an important part in defeating the designs of German militarism.

The accompanying illustration shows a scene in one of the numerous Great Lakes shipyards and shows one of a fleet of ocean going vessels that are being built. From Toledo, Ohio, where these ships were built they were taken through the Welland canal, thence into the St. Lawrence river and into the Atlantic ocean. A number of the big lake freighters have been commandeered by the government and are now in ocean service. In many instances it has been necessary to cut the larger ships in two and send them through the locks

and if you want to do something in a substantial way to help win this war for Democracy here's your chance.

In enrolling for this service it does not mean that you are to give up your regular job and rush off to some shipyard, which at the moment may not be able to accommodate you. Your enrollment in this service simply shows that you stand ready when called upon to do a particular job for a particular wage in a particular place. Everything will be in readiness for you and you will lose no time.

Every person enrolling for this service is given a certificate and a badge that is as much a badge of service to the nation as a uniform.

If you are interested in this service write to Mr. Edward N. Hurley,



THIS ILLUSTRATION GIVES AN EXCELLENT IDEA OF THE KEEL AND BOTTOM CONSTRUCTION OF THE HUNDREDS OF FABRICATED SHIPS BEING BUILT FOR THE UNITED STATES SHIPPING BOARD

of the canal in two sections, which were later joined together on the other side of the locks. This was made necessary because the canal locks were not long enough to pass the larger vessels.

Owing to the fact that the lake vessels were designed for fresh water service it is possible to load them heavier in salt water service. There is so great a difference between the specific gravity of the ocean salt water and the lake fresh water that a fully loaded vessel in fresh water would ride considerably higher in salt water, consequently it is necessary to load these vessels heavier for safety.

There is an urgent need for workers in the shipyards, particularly for men skilled as blacksmiths, acetylene welders and in fact for men engaged in every mechanical calling.

The United States Shipping Board wants 250,000 men to enroll in the United States Shipyard Volunteers

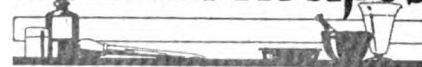
chairman of the United States Shipping Board at Washington, D. C., or write to the editor and you will be given full information regarding this service.

You do not require any previous shipbuilding experience. A ship is merely a big building afloat — the product of everyday skill and industry and the American mechanic can build them.

TO CLEAN BATTERY

The following solution is recommended for cleaning battery plates that have become somewhat sulphated: Half a pound of ammonium acetate in a quart of water. The plates are removed from the battery case and immersed in the solution, which must be hot, and are left therein for half an hour. In some cases it may require a longer treatment to remove the sulphate. After their bath the plates should be washed well in clear water and then dried before being returned to the battery.

Benton's Recipes



Method of Brazing—First clean and clamp the parts to be brazed together tightly. Heat and apply clean pulverized borax. Take a piece of common soft brass in separate tongs and heat to a melting state. Rub this lightly on the part to be brazed. By using this method it is not necessary to have the material you wish to unite as hot as would otherwise be necessary. There is thus less danger of burning or melting, especially if cast iron is to be brazed. Band saws, in fact anything that can be heated a little above a cherry red in a blacksmith fire can be brazed successfully.

Copper Solution that will color on Oily Steel—To make a copper solution that will color on oily steel, take $\frac{1}{2}$ ounce sulphate copper (blue vitriol), 4 ounces water, 1 tablespoonful oil of vitriol (commercial sulphuric acid) and dissolve the sulphate of copper in the water, then slowly add the oil of vitriol a few drops at a time, shaking well at each addition. Keep the mixture away from the face when adding the oil of vitriol; if the oil of vitriol is all poured in the bottle at once the stuff will boil and shatter the bottle, as I learned by experience. A friend of mine has a scar from an acid burn in the eye from the same cause.

TO COAT BRASS OR COPPER WITH TIN—To tin brass or copper melt 6 pounds of tin and pour same into a tank containing one ounce of cream of tartar in about 8 gallons of water. This must be done at a time to sub-divide the tin so as to give larger surface for the cream of tartar to act upon, and have the bottom of tank covered with tin. Then put a fire under the tank and place parts to be tinned in the tank and let them boil for about one hour, or until they are coated sufficiently.

BLACK BRONZE FOR BRASS—Dip the article, cleaned bright, in aquafortis (nitric acid); rinse the acid off with clean water, and place it in the following mixture until it turns black: Hydrochloric acid, 12 pounds; sulphate of iron, 1 pound, and pure white arsenic, 1 pound. It is then taken out, rinsed in clean water, dried in sawdust, polished with black lead and lacquered with green lacquer.

TO POLISH NICKEL PLATE—Apply rouge with a little fresh lard or lard oil by a piece of buckskin. Rub the bright parts, using as little of the rouge and oil as possible. Wipe off with a clean cloth slightly oiled. Wipe every day and polish as often as necessary. This is also an excellent preventative of rust.

MALLEABLE BRASS—Brass which possesses malleability in a high degree can be obtained by allowing 57 parts of copper with 43 of zinc.

RUBBER SOLVENT—Only pure unvulcanized rubber is soluble. However, if the pure rubber is shredded into small particles and covered with mineral naphtha or pure benzole, it will be reduced to a gelatinous liquid. In case a quick drying solution is desired, carbon disulphide should be used as a solvent.

WESTWARD HOE!

Full three hundred years ago
Was heard the slogan, "Westward Ho!"
Which sent the English over seas
Columbia's fertile land to seize.

But when these English gentlemen,
Unused to work in field or fen,
Arrived amidst our pine trees tall,
'Twas found they would not hoe at all.

Till Smith proclaimed with courage meet,
"Who does not work shall nothing eat,"
Then straightway all began to hoe
And in the furrows seed to sow.

Which yielded food enough for all
From our rich soil from spring to fall,
With an abundant winter store,
So none were hungry any more.

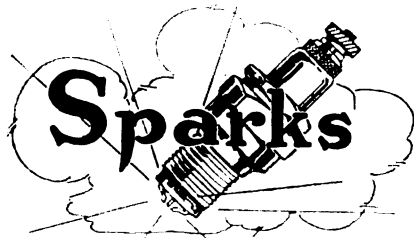
Westward they calmly hoed their way
While empires fell into decay,
Producing every kind of food
That could be grown for human good.

And what they could not use at home
To countries far less blest than ours,
They shipped away across the foam
Though numbered with the mighty Powers.

And now these Powers are calling out
To us to feed them while they rout
The enemy from their loved land,
So we must take a steadfast stand

Against the ruthless German horde
Whose actions have been so deplored;
We'll arm ourselves with gun or hoe
And help defeat our common foe.

L. Bird Mock.



Many a man never knows what he wants
till he can't get it.

Never hit a man when he is down. It
isn't fair and besides he might get up and
lick blazes out of you.

A hot old time is the most efficient
remedy for cold cash.

A man shouldn't try to serve two
masters when he can't even master himself.

You never can tell. Even the bald
headed man may be able to take his own
part.

All things come to those who get out and
hustle.

Blessed are the peacemakers for they
are up against it.

It is necessary to be on the right side of
some people in order not to be left.

Things don't always pan out. Many a
young man of promise has developed a
breach of promise suit.

Some people are dissatisfied because they
can't get what they want and others be-
cause they get what they don't want.

Generosity may be an admirable trait,
but the man who keeps his troubles to
himself is more popular than the man who
is generous with them.

You can't stop leaks in the roof by cov-
ering them with a mortgage.

You may never have sold an engine or a
farm machine, but that's no reason why

you cannot. Get a good agency and work
your territory. It will pay you.

The man who can't trust himself can't
expect credit from others.

Many a man refuses to recognize an
opportunity unless it is spelled with a
big O.

A man may be flat footed and still have
a sharp tongue.

Enthusiasm is a sensation inspired by
things we don't have to do.

The people who are satisfied to take
things as they come don't always make a
go of it. Sometimes things don't come.

Pep will win the war.

The aviator realizes that you can't
keep a good man down.

Misery loves company and unfortunatel-
ly it generally gets what it wants.

When money talks there are none who
turn a deaf ear.

The owl is a wise bird. He not only
knows what's what but who's who.

Now that there's no booze in the navy
do the sailors have to land at a dry dock?

You never can tell. Some fellows make
the best time when they are headed the
wrong way.

Respect another man's point of view.
When you sit on some fellows they act
like a bent pin.

A double wedding is only another
instance of putting two and two to-
gether.

The farmers are coming to the conclu-
sion that it would be cheaper to shoot
their horses instead of feeding them in
idleness all winter long.

When a man says he has "no time to
read" he is voicing a mighty poor adver-
tisement for his personality. The busiest
men in the world are the greatest readers.

A fool there was. He had spare time
and he wasted it.

Time waits for no man. He who does
nothing better today than he did yester-
day is not merely standing still, he is fall-
ing back, for the world each day advances
a step.

Opportunity has a hot foot and a crick
in her neck. She can't look around and
she won't turn back.

One good turn deserves returning.

Popularity consists of giving more ap-
plause and less advice.

Many a man tries to keep his head above
water by drowning his sorrows.

He who putteth his hand to the plow
shouldn't permit his head to be turned by
flattery.

Call a man hard names and he may be
soft enough to stand for it.

Many a man blows his own horn only
to come out at the little end of it.

All is not gold that glitters. Even our
blessings are addicted to camouflage.

A profiteer is a fellow who would bring
home the bacon even on porkless days.

Things That Never Happen—A man left
his car at a garage to be massaged. When
he called for it he asked the man with the
sponge, "Was it very dirty?" "No," he
replied, "not very."

At a hotel a tourist was paying for din-
ner for his party. "I thought a meal here
used to be a dollar," said the motorist.
"It was," said the hotel keeper, "but on
account of the war we reduced it to seven-
ty-five cents."

A man took his wife out riding. She
never told him once that there was a street
car coming.

In a justice court the judge asked the
driver, "How fast were you going?"
"Well, answered the defendant, "about
sixty-five miles an hour."

A demonstrator was showing a prospect

Proverbs of Solumn

VERILY I say unto you: the
smith that worketh cheaper
than his brother is indeed a cheap-
skate and poverty shall abide with
him all the days of his life.

A grouchy smith is an abomina-
tion in the sight of his brothers,
and shall not enter into their good-
fellowship.

The smith that hammereth cold
iron is like unto him who chargeth
not enough for his work. In the
hereafter, both shall dwell where
the iron is hot and the pay suffic-
ient.

—WILL BISHOP.

a car. "How many miles can a fellow get
out of a gallon of gasoline with this car?"
asked the prospect. "Eight to ten."

You can't do any really big thing with-
out getting down and putting your hands
in it, from planting corn to modeling a
statue.

Keep out of debt and danger. Both are
alluring but poor friends to make.

We are compelled to admit that with all
their faults the Czar and the Grand Duke
had better looking whiskers than the
Bolsheviki.

The difference between a wise man and
a fool is that the fool's mistakes never
teach him anything.

The thinker will not drink. The drinker
can not think.

The Russian trouble seems to lie in the
fact that there are too many steering
gears and not enough spark plugs.

Any fool can take a chance. It takes
brains to be careful.

When a barber first begins to drive a
car he gives many a man a closes have.

Little drops of water, little grains of
sand getting in the insides, hurt to beat
the band.

Even the fires of enthusiasm may be
quenched when you stack up against the
fellow who is a wet blanket.

Life without an occasional hill is like a
flat country—easy going but rather un-
interesting.

When hurry interferes with safety, cut
out hurry.

Coasting has wrecked more cars than
climbing and prosperity more men than
adversity.

An expert calls our attention to the fact
that an automobile engine should not be
called a motor—some of them aren't.

Take all the men who have failed since
Creation; take all the causes of their fail-
ures, and, although there be ten, or ten
million, not one is proof of your failure.
Every man is master of his own destiny.

Even a soldier is known by his company.
When you feel like kicking yourself
don't do it by proxy.

War has certainly put the wrist watch
where it belongs.

Luck generally strikes like lightning!
never twice in the same place.

The pen might be mightier than the
sword but at any rate the sword isn't
censored.

The fellow who goes around with his
hands in his pockets is pretty sure no one
else is going to get there.

In spite of a downward movement in the
stock market, spring always brings an up-
ward movement in thermometers.

You never can tell. Many a young fel-
low who is looking for an opening is real-
ly looking for a way out.

Interesting Problems in Farm Tractor Design

C. L. WHITE

BY way of introduction, I wish to have it understood that none of the problems cited in this article are original with the writer. However much of the material is presented in an unusual and non-technical way that makes it prove interesting reading to the man who has had little to do with leverages, forces, and reactions except as they have to do with the practical applications of the crow-bar, peavey, etc.

The most interesting problem is that of "Rearing," or the tendency of the tractor to rise up on its "hind" wheels when pulling "hard." To understand the forces that act on the tractor to produce this effect we will assume that we have a tractor weighing 5,000 pounds, a drive wheel diameter of 48 inches, a distance between centers of front and rear wheels of 8 feet (96 inches), and a maximum draw bar pull of 2,000 pounds. This is purely an imaginary tractor and the figures are made even for convenience in computation.

In order to understand just how we measure and so compare different leverages as to their effective turning ability about any given point, we show in Fig. 1 (a) the force P of the man pulling on the peavey trying to roll the log over about its center O . In this case, if he pulls 50 pounds and we multiply this by the perpendicular distance from his line of pull to the center of the log, O , say 4 feet, we will get 200 units ($50 \times 4 = 200$) which are called "foot-pounds."

If he desired to produce the same turning effect on the log by taking hold of the peavey lower down and pulling at a greater angle, as shown in Fig. 1 (b), it will be necessary for him to pull harder. The product of the pounds pull and the distance from the line of action of the force to the center about which the turn-

ing effect takes place must always equal the 200 foot-pounds, if an equal turning effect is desired. If the "square" distance to the center is 2 feet, then he will have to pull 100 pounds on the peavey as shown in Fig. 1 (b).

If one can but imagine that the big rear drive wheels of a tractor are a great big log which a continuously acting giant peavey, is continually turning over, it will help a great deal in understanding some of the forces that act in and on the tractor.

In figuring out some of these forces on "our" tractor we will first assume that the draw-bar pull is in line with the center of the rear axle. Then referring to Fig. 2 we have the maximum draw bar pull, P , and the tractive effort of the wheels which produces the draw bar pull.

Of course the tractive effort of these wheels must be greater than the resulting draw bar pull, because a not inconsiderable pull is required to move the tractor itself over the ground and through the air. (The air resistance is of course very small.) We have not attempted to even estimate this additional force as it would make little difference in the final results of our computations in the light of what this article is attempting to teach.

To return to the peavey imaginings; all the front parts of the tractor not balanced over the rear axle can be imagined to be the body or pole of the giant peavey. If the tractor is correctly designed, then no man will need to pull down on this giant peavey as the weight of itself will be sufficient to keep its front wheels down to earth.

Now to figure the turning effort of the rear wheels due only to the draw bar pull we find $2,000 \times 2$ feet (half diameter of wheel) = 4,000 foot-pounds. This is the turning effort which we must balance by weight of

the front end of our tractor (peavey) if we do not want it to rear. To find out what weight will be needed at the front wheels we divide the 4,000 foot-pounds by the 8 feet distance between wheel centers and we get 500 pounds. To check to see if correct, 500×8 feet = 4,000 foot-pounds.

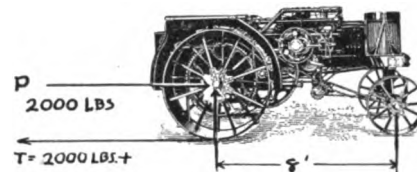


FIG. 2

Fig. 4 shows this required force. It must be understood that to be safe the tractor must have a much greater front end weight than 500 pounds acting on the two front wheels. Probably three times this weight, or 1,500 pounds should stand on these two wheels. The writer has no actual data on this, however. The situation is much helped out by the effect of the draw-bar having its effective pull pass some distance below the center of the rear axle. In Fig. 5 we illustrate how this force acts. If we assume that the line of its action passes 1 foot below the axle center, then the measurement of its turning effect will be $2,000 \times 1$ foot = 2,000 foot-pounds. This is just one-half that of the tractive effect of the rear wheels which means that we have but 2,000 foot-pounds to be overcome by the weight at the front wheels.

Again figuring the needed weight we find it to be only 250 pounds which is much encouraging. It should be noted here that the real draw bar pull is not parallel with the surface of the earth when a plow is below the surface of the ground. This fact brings the line of action of the draw bar pull up closer to the center of the rear axle and thus decreases the leverage action of this pull.

An interesting point in connection with this discussion is the shifting of the effective weights on the front and rear wheels of the tractor due to the "rearing" effect.

In the case of "our" tractor we assumed a weight of 5,000 pounds which we will further assume to be

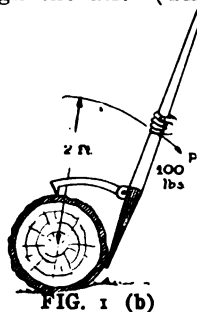


FIG. 1 (b)

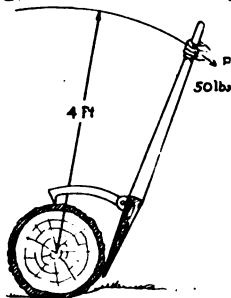
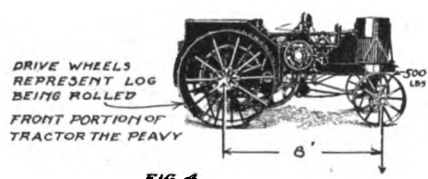


FIG. 1 (a)

distributed 3,000 pounds on the rear wheels and 2,000 pounds on the fronts.

As a result of our computations in the first case where the draw bar pull passed through the center of the rear axles, we found that the weight needed to hold down the front wheels



was 500 pounds which means that under the conditions of 2,000 pounds draw bar pull the front wheels are actually lifted to the extent of 500 pounds (neglecting the effort needed to move the tractor itself) and as old mother earth is holding the whole weight of this machine, this 500 pounds is transferred to the rear wheels. The effective weight thus becomes 1,500 front and 3,500 rear. It is seen, therefore, that the work which the tractor does actually makes it better able to do that work as the rear wheels being pressed down more heavily to the earth, they obtain better "footing" and can pull harder.

LAMINATED GEARS

The word "laminated" simply means a succession of leaves or plys of any material, such as is the case in the springs of an automobile. The latest use of this type of design has been its application to the production of gear wheels. Formerly gears were either cast from a pattern or cut from the solid, each tooth being

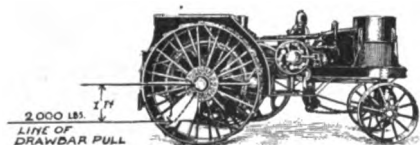


FIG 5

milled individually. Both methods produced a very perfect gear, and one apparently hard to improve. Recently, however, an English inventor has evolved an entirely new form of gear wheel, embodying a new process of manufacture. This gear is described as a laminated gear wheel. It is built up, but upon quite original lines. Instead of taking a solid blank of the required thickness, and machining the teeth, a number of thin disks of the desired metal are produced in an ordinary press, and

the teeth on their circumferences are punched in accordance with requirements. These disks are then built in layers to the requisite thickness, and then clamped securely together by means of rivets, or bolts, producing a gear wheel as solid as that cut from a blank.

This is the elemental process and the disks can be fashioned from any suitable material, brass, mild steel, high tensile steel and so forth, at equal cost for labor. The rivet or bolt holes are punched simultaneously with the bore of the spindle, together with keyways or splineways, or they can be made to fit over a spider.

Should it be essential for the teeth of the laminated gears to be hardened there is no danger of distortion arising from the process, and subsequent grinding is not necessary. In hardening, the disks are packed on a mandrel to form a long pinion, with the teeth in line. Only the working faces of the teeth are hardened.

The machines employed in cutting the disks are of standard design,

3000 LBS BECOMES 2000 LBS BECOMES
3500 OR MORE 1500 LBS OR LESS



FIG 6

while the disks, comprising a punch and die, to produce one tooth at a time, need neither an expenditure of considerable skill nor time in their preparation, and are not so costly as the cutters required for milling gears out of the solid.

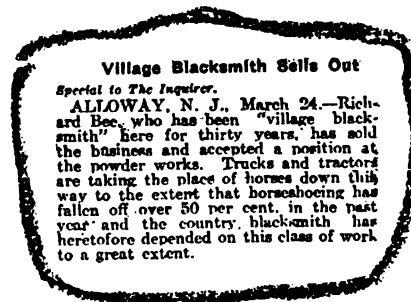
From the searching and varied practical tests which have been made it has been ascertained that the laminated gear presents many advantages over that machined from the solid. It is practically as silent in running as raw-hide or silent chain drives because there is no hammering as each tooth comes into mesh, and because there is no "ring" in the wheel itself.

Another feature that cannot be overlooked is tooth fracture. In the laminated system this could only affect one or two plates, and would not throw the gear out of commission as in the case with a solid gear, while the defective disks may be readily replaced.

WHAT ARE YOU GOING TO DO ABOUT IT?

The clipping shown below is reproduced from the Philadelphia Inquirer.

Items of this sort are daily becoming more common in the daily papers



and this particular case cannot be considered as being an isolated instance of the blacksmith being forced to other work in order to make a decent living for himself and his family.

Mr. Bee, it will be noticed, was in the blacksmithing business in the town in which he lived for 30 years and now he has been forced to seek work in a factory in order to make ends meet.

Blacksmiths who are blind to conditions delude themselves in believing that the day of the horse will return. It is quite true that there will always be horses to be shod but the volume of this business will never again be great enough of itself to justify a man depending upon it for a livelihood.

You doubtless remember the time, not far removed, when everyone traveled with a horse and buggy and when every farmer did his farm work and hauled his produce and supplies to and from town with horses. Some evening take a mental census of the people who formerly brought horses to you to be shod who have bought automobiles, trucks or tractors. When you have done this you will understand why there is no money in shoeing horses.

While many blacksmiths have persisted in their allegiance to the horse they know for a fact that others in their community have set up in the automobile business, in many cases not possessing the mechanical knowledge that the blacksmith does, and from the start make more money with less effort in a week's time than many blacksmiths would think of making in a month.

The fact cannot be blinked that the horse is as much of a back number as the Bryan candidacy for president so why attempt to fly in the face of facts?

The automobile business is now the country's third greatest industry. There are considerably more than 100 firms manufacturing tractors, approximately 150 builders of passenger cars and motor trucks, not to mention a long list of manufacturers who build nothing but motor trucks of various styles and sizes. If you were told that the number of such plants is increasing almost daily, would you begin to realize the magnitude of the industry?

Have you heard of any automobile repairmen recently who have been forced out of business because there has been insufficient work for them to do? You have not.

Ask some friend of yours the prices he is compelled to pay the repair shop proprietor for work done on his car and what he tells you will give you a clue to the money in this field.

Don't hide behind the old moth eaten excuse that "you can't teach an old dog new tricks" or say that you "don't know anything about automobiles." Perhaps you don't. You didn't know very much about the first binder that you were called on to repair or the first mowing machine either, for that matter. There is nothing mysterious about the automobile any more and nowhere can you secure this knowledge any better or easier than from books. Every day that you delay hanging out the sign "AUTOMOBILE REPAIRING" you are losing money that someone else is getting.

The case of Mr. Bee is only another instance where the blacksmith refused to see the light.

The horse may "come back" but for the time being it looks as though it is going to take the horse a long time to get back and frankly, we don't believe he ever will.

AN IMPORTANT DISCOVERY

The reported discovery of molybdenum in Canada is not without interest to the steel trade. It is stated that a free milling ore has been found which is very rich in molybdenum—a metallic element rarely found in paying quantities. This element is a silvery-white metal, hard and somewhat malleable. The metallic molybdenum is of extreme value in the production of alloy steels, as molybdenum steel resembles tungsten alloy steel very closely, but one per cent. of molybdenum replaces over 2 per cent. of tungsten in the mix. It gives a self-hardening steel of extreme toughness, which used for metal cutting retains its temper even at a bright red heat.



FORD ACCESSORIES NATIONAL EXHIBITION

WILLIAM K. GIBBS

Just as the march of progress is ever toward something greater in which old methods give way to those of a new generation, so must the Coliseum, the time honored show place of Chicago, give way to a newer institution—the Municipal Pier. Built as a show place as well as a utility and open to the public for two years, the first real exposition to be held in this "Seventh Wonder" of Chicago's attractions will be the Second Annual Exposition for Ford Accessories but which will henceforth probably be known as the Automotive and Accessories Exposition.

Directors of the National Exposition for Ford Accessories recently held a meeting at which a change in the name of the organization, dates for the show and the building in which to hold the show were decided upon. With a two-thirds vote of the stockholders, which will likely be obtained, the organization will change its name to the Automotive and Accessories Exposition, Inc. This, it is believed, will be more in keeping with the enlarged scope of

the body and its plans, which are to include not only accessories for Fords but for all cars and in addition, will admit for exhibition trucks, tractors and motorcycles, but not passenger car exhibits.

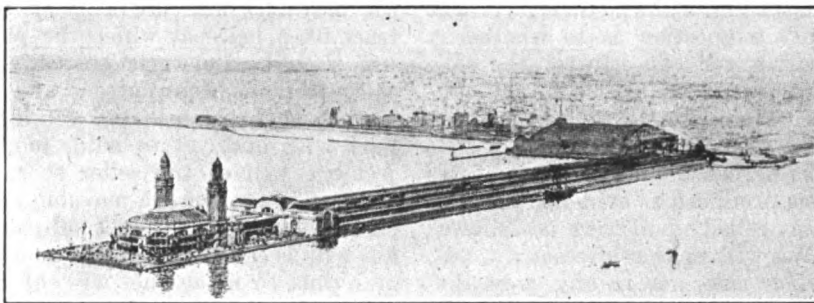
Originally it was intended to hold the show the week beginning September 21, but this has been changed and the date moved forward one week, to come sufficiently close to the official closing of the pier with an interval for decorating.

Not only will the show organization have the co-operation of other similar organizations but of the city as well for this will mark a new epoch in the history of the pier. Thousands of people who come to Chicago are keen to see the pier and this will afford them an opportunity to combine a sightseeing trip with one of inspection of the very latest fittings for motor cars and an exposition of trucks, tractors and motorcycles, all of which are playing such an important part in our fight to defeat the Hun.

Mr. J. E. Duffield, of the Bailey Non-Stall Differential Corp., of Chicago, is president of the organization which promotes the show and B. L. Gray of the Gray-Heath Co., of Chicago, is treasurer. H. V. Buelow, of Toledo, Ohio, who managed the show last year, has been engaged as manager of the 1918 show.

ROUGHING A PUNCH

In punching down the head of a nail, the woodworker often experiences trouble with the punch slipping. This can be obviated by annealing the punch and then striking a sharp blow on the face of a file, holding the punch vertical. Turn the punch half around and hit another blow. The file teeth leave serrated impressions on the nose of the punch that will prevent slipping from nail heads. Harden and temper the punch and it is perfectly roughed.



CHICAGO'S HUGE MUNICIPAL PIER WHERE THE EXPOSITION IS TO BE HELD. THE GREATEST PIER IN THE COUNTRY AND COMBINES AMUSEMENT AND RECREATIONAL FEATURES ALONG WITH ITS WHARFAGE FACILITIES

MANUFACTURERS CANNOT CONTROL RESALE PRICE

RALPH H. BUTZ

A question that has been a fruitful source of controversy and litigation for many years has finally been answered in unmistakable terms by the Supreme Court of the United States in a decision handed down quite recently. This decision is of great importance, affecting the business policies of thousands of business organizations in many different lines of business.

For many years manufacturers and jobbers of patented and copyrighted articles have contended that they have the absolute right to dictate the prices at which these articles shall be sold to the consumers by the dealers. In most instances where the dealer sought the agency for such articles he had to sign an agreement by which he bound himself to maintain the resale prices as set forth in the official list issued by the manufacturer. The manufacturers claimed that these agreements were not unreasonable and that their terms could be enforced by resort to the patent or copyright laws, depending upon whether the articles were patented or copyrighted.

The suit, which was brought to the Supreme Court for decision, arose when a dealer, who had signed one of these iron-clad agreements advertised the manufacturer's product at price below that quoted in the official price list. The manufacturer immediately filed suit against this dealer to enjoin the alleged violations of the contract, claiming that price maintenance was a part of the remedy given by the patent laws to protect the patent rights of the manufacturer. It was plainly a question as to whether a manufacturer can control the selling price of an article to the consumer after title to that article has passed to the dealer.

The agreement signed by the dealer was produced as evidence, and the clauses relied upon were as follows:

"We will neither give away, sell, offer for sale, nor in any way dispose of such goods, either directly or through any intermediary, at less than such list prices, nor induce the sale of such goods by giving away

or reducing the price of other goods, nor sell or otherwise dispose of any of said goods, directly or indirectly, outside of the United States, and we understand that a breach of this agreement will amount to an infringement of said patents and subject us to a suit and damages therefor. We admit the validity of all patents under which said product is manufactured and hereby covenant and agree not to question or contest the same in any manner whatsoever. We further understand and agree that this license extends the right to market said product from the below mentioned address only."

The court did not find that the patent laws or copyright law gave the manufacturer the privileges which he claimed in this agreement, and in its opinion held: "Whether a producer of goods should be per-

price for the future could not be exerted consistently with the prohibitions against restraint of trade.

The court also pointed out that in a previous case it had been settled that the exclusive right to vend a copyrighted article given by the copyright law did not give to the owner of the copyright the right to sell for a price satisfactory to him, and by a notice placed on the article to fix a price below which it should not be sold by all those who might subsequently acquire it; and that as such a right was not secured by the copyright law or the remedies which it afforded, a court of the United States had no jurisdiction to afford relief on the contrary thereof.

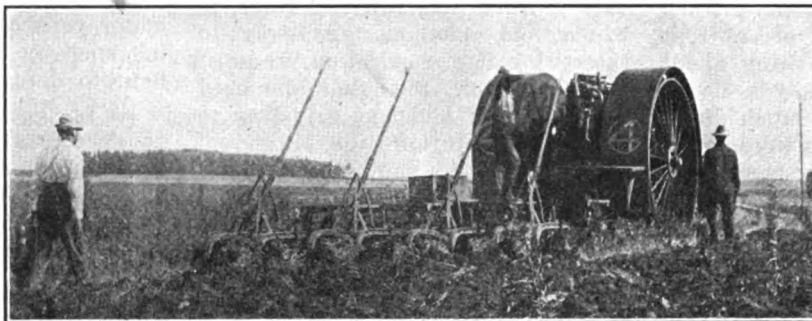
In conclusion the court states: "There can be no doubt that the alleged price fixing contract was contrary to the general law and void.

There can be equally no doubt that the power to make it in derogation of the general law was not within the monopoly conferred by the patent law and that the attempt to enforce its apparent obligations under the guise of a patent infringement was not embraced within the remedies given for the protection of the rights which the

patent law conferred."

The two most important questions asked were these: "Do the recited facts disclose that some right or privilege granted by the patent laws have been violated?" and "Can a patentee, in connection with the act of delivering his patented article to another for a gross consideration then received, lawfully reserve by contract a part of his monopoly right to sell?" To both of these questions the court answered, "No." But it was clearly pointed out that the manufacturer of a patented article is not deprived of any right coming within the patent monopoly, only that the monopoly granted by that law can not be extended so that it will apply to articles after they have gone beyond the manufacturer's reach.

If the manufacturers propose to continue their policy of fixing the resale prices of their products they must apply to Congress for legislation that will give them this privilege. The Federal Trade Commis-



FROM THE LOOKS OF THINGS HERE LOFFELMACHER BROTHERS AND THEIR BIG FOUR TRACTOR OUTFIT ARE DOING THEIR "DURN-DEST" TO DEFEAT ME UND GOTT IN MINNESOTA'S FERTILE ACRES

mitted to fix by contract, expressed or implied, the price at which the purchaser may resell them, and if so under what conditions, is an economic question. To decide it wisely it is necessary to consider the relevant facts, industrial and commercial, rather than established legal principles."

However, it was pointed out that in another and similar case, it was decided that under the general law the owner of movables could not sell the movables and lawfully by contract fix a price at which the product should afterward be sold, because to do so would at one and the same time be to sell and retain, to part with and yet to hold, to project the will of the seller so as to cause it to control the movable part with when it was not subject to his will because owned by another, and thus to make the will of the seller unwarrantedly take the place of the law of the land as to such movables. It was decided that the power to make the limitation as to

sion has already been applied to and may be able to grant relief in some form.

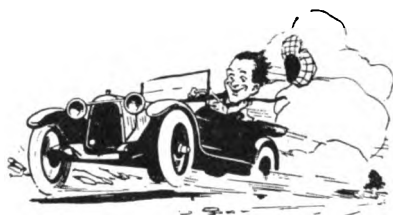
AUTOMOBILE PAINT SHOP JOTTINGS

M. C. HILLICK

The blacksmith and automobile repairer who gets into the painting branch of the business is likely to encounter some flaking and peeling of the paint and finish from steel and metal body sheets which may happen to be rather thin and perhaps insufficiently supported and therefore subject to unusual vibration. Such sheets of metal are prolific in their capacity for expansion and contraction, and when the paint foundation has grown thick and has reached an age of from three to five years, this sudden expansion and equally sudden contraction, is likely to throw the finish completely off the surface right down to the bare metal. The writer has witnessed numerous examples of this trouble during the past winter, and doubtless some will have opportunity to observe this same surface condition to a greater or less extent as the months go by. Cracking and flaking of the finish as a result of this expansion and contraction may be expected to develop at any time due to the strain put upon the surface during the past winter of exceptional severity. When a case of the kind occurs the only safe and sure remedy is to apply varnish remover to the affected spots, or to the entire sheet of surface, and fetch the finish entirely off. Paste varnish remover will perform the work most effectively; the only danger in the use of this medium being from traces of the remover left upon the surface. This should not be allowed. The surface should be first washed with alcohol, or vinegar, and next with turpentine, all mediums being freely used. The surface then to be wiped thoroughly dry. Of course, the shattered patches of finish may be scraped with a steel scraper and all the shelly material removed; the bare places then to be touched up with a good iron oxide pigment carrying equal parts of turpentine and raw linseed oil. In due time, say, 36 hours, putty and putty glaze the spots with a hard drying putty, making the application as smooth as possible to save labor in sandpapering. Having brought the parts up level with the balance of the surface, making sure that the edges are smooth and fine, with nothing to show between the new

and the old, the surface may then be brought along in the usual way.

Removal with varnish remover is the superior method, however. That the finish does go this way at times need not be accepted as a token that the painting and finishing is at fault; a little investigation may disclose the fact that expansion and contraction may have been the original cause of the present state of things. A knowledge of this may help the beginner in settling the difficulty. The question of painting automobiles with the aid of the baking oven is one which concerns almost any one who undertakes to do painting. The baking oven has been pictured as the ideal means of painting the car quickly, which it is, but the average painter located in the small shop may not feel equal to installing an oven, the seeming expense being more than the volume of the business will warrant. However, a small oven for baking the small parts of the car will be found a great convenience and a labor sav-



ing device. At the present time an electrically heated oven is the most available one; it will cost more to install, but the expense of operation will be less, and greater efficiency may be had together with a better class of results—cleaner, quicker, cheaper, and more satisfactory from all points. When situated so that the oven can be taken advantage of it will be found an almost indispensable feature of the shop equipment. After installing the oven the owner of it may wish to know something about heating the colors, varnishes, etc. As a matter of fact, he will need to know these things. Black may be perfectly baked in six hours at a temperature of 200 degrees. White, the opposite of black, will need to be baked at a temperature running from 85 to 125 degrees. While there are variations in the composition of colors and the degrees at which they should be baked, the average, excluding white, will run at about 170 degrees at six hours. Primers and surfacers, and foundation coats in general, should be baked as a rule for three hours at a temperature of 200, degrees.

Finishing varnishes, both body and running parts, will safely bake for five or six hours at from 110 to 150 degrees. Lamps, hoods, and small parts easily detachable, will bake for from four to six hours at a temperature of from 150 to 180 degrees. It will be understood that these parts may be baked quicker and at a higher temperature, but the best authorities are agreed that it is better to bake the surface and materials at a slower rate and at a lower temperature than to use the higher baking degree. More elasticity of film is thus established and a better wearing finish must result. It is claimed for the baking system, that it dispenses with the use of much of the artificial drying mediums, and therefore insures for the paint and varnish fabric a greater amount of elasticity at the same time securing a quick and safe drying process. It need not be inferred from this, however, that the natural air drying method of finishing vehicles is no longer reliable and qualified to produce good results. This is the generally practiced method today, but where it is possible to install at least a small oven for baking the small parts of the car, such a device will be found a fine help in getting out equipment in quick time and in a shape that shall correspond to the balance of the car. For hurried work the painter can help himself a great deal by using his shop in the nature of a warming oven. Run the temperature up to a degree that will hasten the drying of coats as they are applied. The shop will need to have either plastered walls or walls made of two thicknesses of matched lumber; the ceiling to be of the same construction. In this apartment the temperature may run up to 100 degrees, and with a good stove maintained at that point. Under such drying conditions it is possible to get out work at practically oven baking speed. Steam pipe radiation is of course far preferable to stove heat, and is also more dependable, but where there is a will there is a way, and if it is desirable to hurry work along to meet emergencies and the demands of the rush season this hot shop system will be found a real practical help in this direction.

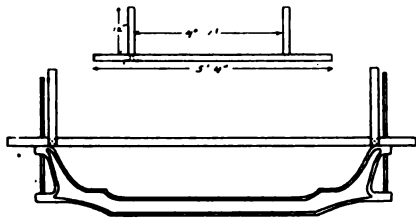
If a file persists in keeping dull, dip it in gasoline and then scrub it thoroughly with a good stiff wire brush. Keep this up until the dirt in the serrations of the teeth is cleaned out. To prevent further dirt clogging, rub the file liberally with chalk or soapstone.

FRONT AXLE GAUGE

I have been looking for a long time for some one to open up on the job of straightening and setting front automobile axles, how he did it and what means he used to assure himself that he was right.

Straightening axles is an every day job in this country and until I made the set of tools I use on these jobs I did a lot of unnecessary work on them. This gauge or set applies only to the front axle.

I heat and straighten up the axle as near as possible with the eye and then place it in the vise at the center of the axle or as near the center as possible. In the pivot pin holes I place a piece of cold rolled shafting about 14 inches long. These pieces must be perfectly straight and true to the size of the pin holes in the axle. Several sets of these pins can be



FRONT AXLE TRUING GAUGE

made to accommodate axles of the most common makes of automobiles that one is likely to encounter.

Lay the gauge across the top of the axle as shown in the illustration and when you have set your job so that the pins line up with the gauge *exactly*, your wheels will run true, providing the spindle arm is not bent or the hub flange knocked out of true, which often happens in a bad "head-ender." Some axles have a lug machined on them to keep the pivot pin from turning and this interferes with the gauge coming down to the machined bearing on which it must rest and I chip off a small portion of these lugs with a sharp chisel, enough to let the gauge down in the proper place.

The stock I use for the gauge was $1\frac{1}{2}$ by 4 inch, machined perfectly true on one edge. The upright pieces were taken from two pieces of an old steel square and were riveted to the main bar. Pains must be taken to have the two upright pieces at right angles to the main bar. The dimensions of the gauge are indicated in the illustration.

HARRY A. BOYER, Illinois.

Make a friend of the local editor. Every little bit of publicity helps build business.

ORNAMENTAL HINGES

F. Y. DUNLOP

The application of artistic wrought iron work, mainly of early pattern, is now widely extended.

Gates and railings, locks and keys, latches and drop handles with their ornamental plates constitute some of the objects to which the making by hammered iron is particularly adapted, and iron rivals brass as a material for an indefinite variety of church purposes.

In studying the more complicated details of the elaborate specimens of early wrought iron church work it becomes clear that not only were the various features well thought out in design but that they must have been formed according to carefully prepared drawings and in cases of where many pieces of precisely similar shape were employed, jigs and special tools to form them must have been previously made, for such surprising uniformity could hardly be attained without making use of such methods.

The earliest example dates back to the Norman period or about 1066 A. D., although such ancient specimens are not often met with.

In this period we have two fine specimens. They are the west door of Woking church in Surrey and at Compton in Berkshire. At this period there was not much scroll work attached to them and the turns were often rather stiff and clumsy.

In the Gothic style, hinges were ornamented with more elaborate and graceful scroll work, nearly covering the whole door and these were often enriched with leaves on the curls and, occasionally with animal heads.

At all times in this class of work, the nails were made ornamental and the main bands were stamped with various minute patterns. Of course,

in examining these interesting relics of iron work we are, in great measure, reduced to guessing at the means employed to produce them. Still it is safe to conclude that the means adopted by the early smith were largely the same of his brother in trade today.

The wrought iron work which is shown in line and halftone illustrations is a 13th century hinge, of which the Bishop of the church or a brother of some monkish order was responsible for the design. They would, in all probability have the design prepared full size which would be put into the hands of the master smith. Possibly he would be an artist in his particular line, for I find that in referring to the many church records that the most of this work in each district has all been entrusted to the same person.

Having concluded his first ideas of how the iron work is to be carried out he would probably have templates made of the main stems and scrolls. At this day the templates would be made of sheet iron cut to the exact size. After this his assistant would be set to work forging the iron to the proper width and thickness.

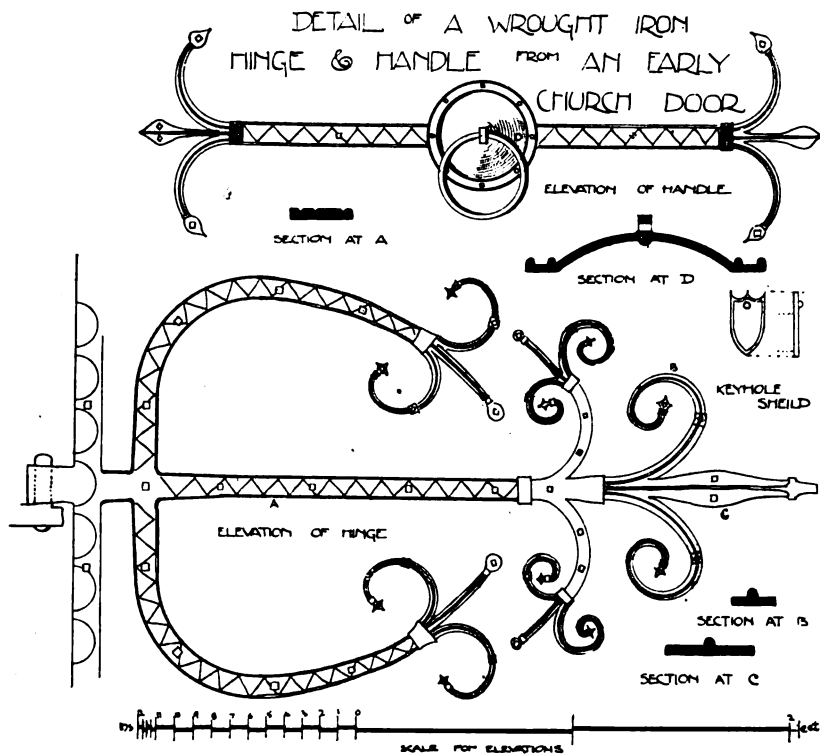
Having cut and shaped his iron to the outline of the different parts of the template he would proceed to bump them into the hollow form shown in the drawing and to do this he probably required a special top tool.

Having finished the three main stems, he would chase and set them in order and after having scarfed the ends ready for welding would put them aside and begin work on the scrolls.

In commencing the scrolls he would find the exact length of a piece of iron to make the scroll and proceed to make the swell on the



VISIONS OF THE GLUE FACTORY DO NOT HAUNT THE SUPERANNUATED AUTO. THIS AUTO OF ANCIENT VINTAGE HAS BEEN CONVERTED FOR HIS PURPOSE BY A TOLEDO, O., GREEK AND IS A GOOD EXAMPLE OF WHAT BECOMES OF OLD AUTOS



iron which is required for the center ornament. Then he would proceed with the set of the scroll and give it its proper curve.

Having completed all parts of the hinge and having them all ready for welding he would probably commence with the small scrolls and when he had formed all of the small scrolls he would weld the parts which form the letter "C" of the hinge. He would next form the collars around the junctions of the stems and scrolls.

These collars give one the impression that they are there to hide these joints but in this example that is certainly not the case and are evidently made for the sake of appearance.

When the collars are forged into their proper shape to overlap the scroll and stem, they are riveted from behind.

The style which runs completely around the job and on which the whole hinge hangs, is probably welded in two or three places and the hinge proper on which the door swings is what is known as a hook and eye hinge.

The door handle which is also shown, extends almost entirely across the door but is in no way connected to the style which goes around the job.

The drop handle is in the center of the stem which is ornamented at both with a leaf and curved stems.

Where the joint between the stem and the ornament is formed a small collar is riveted on.

The circular plate which receives the drop handle is conical in shape, a section of which is shown at D and this idea has been worked out to cause the handle to hang clear of the door.

BORAX AS A FLUX

The action of borax as a flux appears to be one of melting in its own water of crystallization. When heated above a red heat, it fuses and makes a sort of glass, which will adhere to metals even up to the welding heat and higher. It is this property of coating the surface to which it is applied at a temperature below that at which active oxidization takes place, and staying there until the welding or brazing heat is reached, that gives it its value to the blacksmith.

Various mixtures of borax with other elements are used. How much more valuable they are than borax alone is difficult to determine, because the process of welding is so dependent on the personal element that a man's judgment may be influenced by things which have nothing to do with the results obtained. One of the substances mixed with borax is sal-ammoniac. This is supposed to make a compound which will restore "burnt" steel, or steel which is sufficiently overheated to make the grain coarse and crystalline.

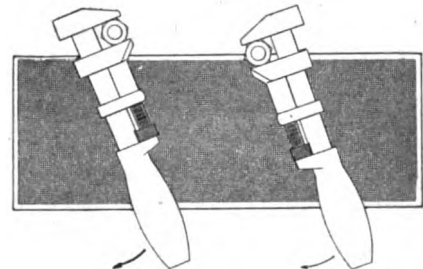
USING A MONKEY WRENCH

A good preventative of skinned and bruised knuckles is to use your monkey wrench properly — never knew there was a proper way to use a monkey wrench? Well, there is.

Lots of times the wrench is used to take the place of a hammer and this sooner or later results in damage to the adjusting screw or the jaws so that when the wrench is put to its proper use the jaws slip around the nut and more knuckles are skinned.

If the wrench is used in the position shown at the left for tightening a nut, the jaws are likely to spread and to slip off the nut when force is exerted on the wrench handle. The correct method is shown on the right. When the wrench is used in this way the pull on the handle tends to tighten the jaws, and thus causes them to grip the nut more firmly.

As an additional precaution, avoid

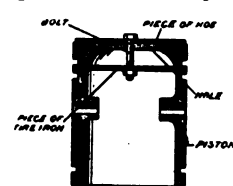


RIGHT AND WRONG WAYS TO USE A MONKEY WRENCH

using a monkey wrench as a substitute for a socket wrench whenever possible.

PISTON HEAD REPAIR

They don't break very often and they don't always break in the same place but this repair was made with quite satisfactory results by using a



REPAIRING A BROKEN PISTON HEAD

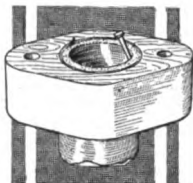
piece of an old hoe, cut a trifle smaller than the piston diameter and large enough to cover the break. A hole was bored in this and through the piston head, a piece of tire iron an inch wide and an inch and a half thick was placed underneath and the whole bolted together on the under side.

H. G. CRAFTS, Ohio.

Ten countries have adopted the plan of daylight saving—England, France, Holland, Denmark, Norway, Sweden, Italy, Portugal, Germany and Austria.

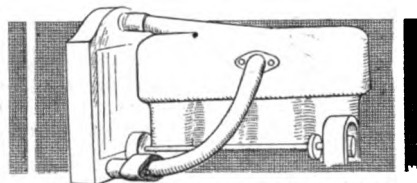
WHEN THE PUMP GOES ON THE BLINK

When the circulating water pump breaks and a long wait will be necessary for replacements, which is usually the case, the water can be shunted around the pump and the engine cooled very satisfactorily by the thermo-syphon system, as illustrated.



HOW THE WOOD-EN CONNECTION WAS MADE AND THE HOSE ATTACHED

A piece is cut from a piece of hardwood about $1\frac{1}{2}$ inch thick into the form shown. The inside hole is drilled just large enough to fit a piece of common garden hose. The hose should be held in place in this block by a coat of iron, cement or waterproof glue and a nail will keep it from pulling out.



SWITCHING OVER TO THE THERMO-SYPHON SYSTEM WHILE THE PUMP WAS BEING REPAIRED

Usually the same shaft that drives the water pump drives the magneto and distributor so it will be necessary to leave the shaft in position.

E. M. SCOTT, Kansas.

TEMPERING SPRINGS BY SMOKING

An old blacksmith adheres to a method of tempering springs which he contends gives excellent results. He places the spring inside a piece of steam pipe and heats both pipe and spring to an even dull red. The pipe and spring are allowed to "soak" in the fire until the proper heat is reached, then the spring is allowed to slide into a wire bag suspended in cool water. When cool—and it is as brittle as glass—it is carefully dried. A few drops of machine oil are put on a piece of paper and set on fire and the spring is fully and entirely coated by the smoke from the oil flame.

When well smoked it is heated very carefully and slowly until the smoke coating is burned off. This can be done inside the pipe, heating until every vestige of smoked surface is clear. When this stage is reached, lay the spring aside and let it cool off naturally. This method may take time, but it is worth trying, according to the old craftsman.

TRY THE TYPEWRITER

The average blacksmith is not a good penman, and as a general rule, he hates writing letters. It pays for a man to buy a second-hand typewriter, for with a little practice he can become sufficiently expert to write his letters upon it. Answering letters and writing orders to the supply house will become less of a horror. It is also so easy to keep a copy of every letter written and every order placed, while typewritten correspondence gives your letter a businesslike appearance.

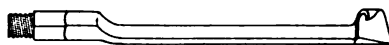
A little practice will soon give you enough speed for all ordinary purposes, and a second-hand machine can be bought for \$15 or \$20. For keeping a copy of what you write, and for expeditiously taking care of your correspondence, nothing can compare with the typewriter. It is far more easily learned than you think, and once learned you would not be without it.

DRILL ROD FISHING TOOL

Sometimes the blacksmith is asked to fix up something to get lost pipe or sucker rods out of a well and this may help some fellow out.

The "crow foot" should be made of $\frac{1}{4}$ by $1\frac{1}{4}$ inch bar. The illustration will give an excellent idea of its appearance when completed. It can be used for lifting light tools, pump pipe or anything having a projection or collar for the tool to catch under. The upper end of the shank is threaded to connect to gas pipe, or a pin may be welded on to connect it with drilling or fishing rods.

I have lifted 500 pound tools with such a "crow foot" made of $\frac{5}{8}$



A HOOK FOR SUCKERS (PUMP) AND LIGHT WELL DRILLING TOOLS

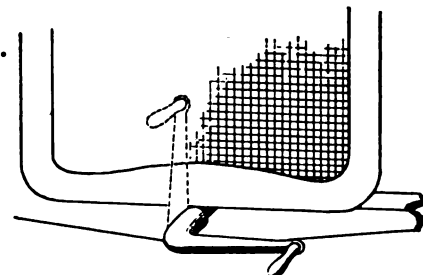
inch round iron. The idea is to make the back of the hook lower than the open side so that the object to be lifted will hang back in the hook which should be of such size as to fit the smooth part of the pipe or tool in the well fairly close.

L. R. SWARTZ, Penna.

Every time you change a wire wheel put grease on the metal surfaces of wheel spindle where the hub touches it. If this is not done the wheel will rust and stick to the spindle and it will be extremely difficult to separate.

CLEVER ADVERTISING SCHEMES

A firm of Canadian repairmen who made a specialty of burning carbon from auto engine cylinders by the oxygen process had a number of shipping tags printed announcing: "Knockers wanted—If your engine knocks, bring it to us and have the carbon removed from the cylinders



PROPER AND IMPROPER POSITIONS FOR THE "ARMSTRONG" STARTING SYSTEM. THE DOTTED LINES SHOW THE WRONG WAY

by the new oxygen process. No delay. While you wait." Of course the firm name and their address was also given.

These tags were attached to all standing cars and resulted in quite a run of this work in addition to what other work was obtained as an indirect result of this plan.

HINTS ON SANDPAPER

To prevent sandpaper from scratching the surface of a job, moisten the back of paper. This allows the paper to get into all sunken spots. Sandpaper is generally made from sand, flint or glass, all pulverized to proper degrees of fineness. It is easy to test sandpaper for quality. Poor paper will crack badly when doubled, and if you rub the two sides of a sheet of sandpaper together and a lot of sand comes off it is poor stock. Good sandpaper is tough and elastic, the sand holds very tenaciously, it has been sifted evenly on the paper and cuts clean and fast. Always keep sandpaper in a dry place. To make it cut faster, wet it with benzine. To prevent the paper slipping from your hand, chalk the back of it. Never use more than a double—one piece at a time, and to cut a sheet in two, fold it square, sanded part inside, which prevents cracking, and slit up with an old knife.

Nobody can scare us with rumors of depreciation in the price of bacon.

Whenever a slacker comes in, close the window. He can't stand the draft.

THE ARMY HORSESHOER

The Single-foot

65. The single-foot is an irregular gait, in which the front feet move in the order of a slow trot and the hind feet at a fast walk. Each foot strikes the ground singly. The action of the front feet is high, and there is a lateral swing to the hind feet.

To convert a single footer into a trotter, use heavy toe weight shoes in front and ride the horse with a loose rein and an easy bit up a gentle slope. Just as the horse increases the gait from the walk, the rider should seize one of his ears. It is found in practice that this plan distracts his attention and allows the weighted shoes to produce the effect intended. Whenever the horse returns to the single-foot, he should be brought down to the walk and started again with the grasp on the ear. This method may sometimes be found of use, but, like the pacer, the single-foot horse should have no place in the service.

66. When a horse has been shod to improve his gait, he should be ridden with a snaffle bit, which admits of greater freedom of movement. The reins should be held with a light hand, and the horse should be forced up against the bit by the use of the legs.

Correcting Faulty Action

67. It is a well established rule in shoeing that, in order to correct faults in gaits, the shoes should proceed gradually from one extreme to the other.

Forging

68. Forging, or clicking, is a fault in gait at the trot, the toe of the hind foot overtaking and striking the bottom of the fore foot.

CAUSES—Faulty conformation; horses with short bodies and relatively long legs; horses with front or hind feet set too far under the body. Leg weariness, a condition caused by debility or over exertion. Improper preparation or shoeing that tends to slow the action of the front feet, as feet with toe too long or heels too low; shoes too long or too heavy. Preparation for shoeing that tends to increase the action of the hind feet, as feet with toes too short or heels too high; shoes with heel calks and no toe calks. Rough ground and poor horsemanship; the reins held too loosely, the horse not being kept up to the bit.

REMEDIES—To correct this defect by shoeing, the object of the shoes is to quicken the action of the front feet and to slow the action of the hind feet.

Three methods for the correction of forging are given. The first method is a mild corrective treatment, while the third is adopted only as a last resort.

First or mild method.—For the front feet, lower the toes and leave the heels a trifle high. The heels of the hind feet should be lowered and the toes left a trifle long. The front shoes should be light in weight; the heels of the shoe fitted short so as to just cover the buttress; the toe of the shoe rolled to its full extent, to increase the rapidity with which the foot breaks over. The hind shoes should be a trifle heavier than the front shoes, and the heels left a trifle long. In order to prevent the noise made by the striking of shoe on shoe, should the feet occasionally meet in action, the hind shoe should be squared at the toe and fitted so that about three quarters of the wall at the toe projects over the shoe.

Second or medium method.—Normal preparation of the feet. Use a fairly heavy toe-weight shoe in front and heavy side-weight shoes on the hind feet, the weight and trailer being on the outside. The effect of the toe weight is to increase the forward extension of the feet with low action; the side weight and trailer on the hind feet induce an outward swing of the foot and leg, thus giving the front feet more time for breaking over and getting out of the way.

Third or extreme method.—Prepare the feet as explained for the first method. The front shoe should be light in weight, fitted short at the heels, and with short-heel calks inclined well to the front; toe of the shoe thoroughly rolled. The hind shoe should be heavy in weight, with a small toe calk set well back from the front edge of the shoe; toe of the shoe squared; heels long and side clips between the first and second nail holes.

The calks on the front shoe raise the heels, thus diminishing the distance which they must be lifted by the flexor tendons, and consequently cause more rapid breaking over. The toe calk on the hind shoe raises the toe, thus increasing the distance the heels must be lifted by the flexor tendons, and consequently delays the breaking over of the foot. The long heels also increase the labor of the tendons by their extra weight. By using this method the feet are thrown so far out of their natural position that the ligaments and tendons are apt to be seriously affected in time by

the heavy strain placed upon them.

Stumbling

69. The horse stumbles in breaking over, or just after breaking over as a result of not raising and carrying a foot high enough to clear the ground. Horses stumble more frequently with the front than with the hind feet.

CAUSES — Poor conformation; Horses with light fore quarters and heavy hind quarters. Weakness: during convalescence from severe sickness or as the result of a strain of a leg muscle. Fatigue: Induced by long marches or by drawing or carrying heavy loads. Improper preparation: Toe left too long. Improper shoeing: Shoes too heavy or fitted too full at the toe. Laziness, particularly when going down hill, rough ground, and poor horsemanship.

REMEDIES. The bearing surface of the foot must be leveled, the toe shortened, the shoe made light in weight and thoroughly rolled at the toe, and the thickness of the heels of the shoe slightly increased. This shoe induces more rapid breaking over. The full roller motion shoe is frequently of value in the prevention of stumbling because it not only causes a rapid breaking over of the foot but produces higher action.

In cases of stumbling where calks are necessary to prevent slipping, use heel calks and short quarter calks welded on web of shoe between first and second nail holes.

Interfering

70. A horse interferes (strikes) when he is in motion by striking any part of a limb with the opposite corresponding foot. Since this fault leaves evidence by rubbing off the hair and even breaking the skin, it is an easy matter to determine whether one or both feet need correction.

CAUSES — Poor conformation, fatigue, faulty or neglected shoeing.

Horses with good conformation and straight, upright limbs will not interfere if properly shod. Those that toe out generally strike, because the clearance space between the limbs is reduced, while those that toe in usually travel wide. Straight limbed horses with narrow chests also have a tendency to interfere. In order to correct interfering, the shoer should study carefully the shoeing, the conformation and the gait of the horse. The first step is to determine the exact part of the hoof that strikes. This may be readily learned by chalking the inside of the wall and trotting the animal slowly.

(To be Continued)

Queries-Answers-Notes



THIS department is the meeting place where you are free to ask for information, answer questions, discuss shop matters and business conditions and any other notes you feel would be of interest to a fellow mechanic. Make use of this Department as often as desired.

Trouble With a Bosch—I have a White car, model G/A which is about ten years old and want some information in regard to the magneto which is a Bosch Model DU/4, which is a high tension and uses no batteries at all, cranking on magneto direct.

By retarding the spark for cranking I get a good spark at all times and have no trouble in starting, but if spark is advanced I cannot get spark enough to start and neither will the engine run as well with the spark advanced as it will when the spark is retarded. Should I come to a hill with the spark advanced, the current is so weak that it will not climb unless retarded when it will pull very well.

I am compelled to run most of the time with the spark retarded to get the best results. It never kicks back or knocks, but even when standing still and the engine running idle, it will develop more speed with the spark retarded than when advanced.

The Bosch people wrote me that it was designed to furnish a hot spark at low cranking speeds and would be all right at 400 or 500 r.p.m. but it is not that way.

Would the trouble be that the magnets are weak or is the timing of the magneto at fault, or something else? I have new platinum points and all is well except that I get but weak current if the spark is advanced.

F. G. Hoskins, Texas.

In Reply—The first thing to determine is whether the spark on your car is advanced by the movement that you think is correct. I have seen cases where the connecting levers had become changed so that it was necessary to move them in the opposite direction to obtain advance or retard. Remember that when the breaker housing is moved in the direction in which the magneto turns, it is retarded. And the opposite is advance, of course.

After checking this, next determine whether the magneto is correctly timed. To do this, turn the engine over until No. 1 piston is at the top on compression stroke. Retard the spark lever to its full extent. The breaker points should just be separating at this time; that is, just as the piston is at the top on compression stroke, and spark lever fully retarded.

If the timing is correct, then the trouble is in the magneto itself. The breaker points are not separating at the correct time with relation to the position of the armature. With the spark lever fully advanced, the breaker points should just be separating as the armature closes the space between the pole shoes. To see this it is necessary to remove the collector

ring brush and then the cover that fits in over the armature. The correct position of the armature for the points to be breaking with the breaker housing in advance position, is shown in Fig. 1.

One cause for such a mistake may be that your magneto breaker mechanism was originally intended for an instrument

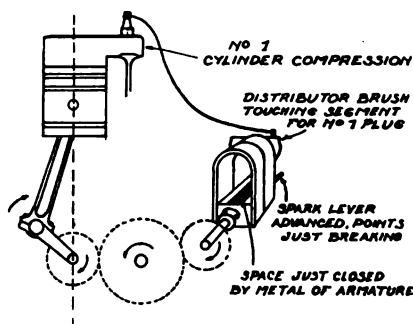


Fig. 2

operating in the opposite direction of rotation. A small arrow on top of the oil hole cover at the drive end of the magneto indicates the direction in which the maker intended it to run. If it is now turning in its intended direction as indicated by this arrow, then the trouble may be due to the fact that someone put on the wrong breaker mechanism for this direction of rotation. Of course if you discover that the magneto is turning in the wrong direction; as indicated by the arrow, then the cause of the trouble is obvious.

Now, in order that the whole matter may be clear we will endeavor to show just the relation of all the parts when they are correct.

Figure 2 shows the relation of the breaker points to the armature, and the relation of the distributor brush to the piston when the spark is in its greatest advance position.

Figure 3 shows the relation of all these parts to each other when the spark is in its greatest retarded position. As these

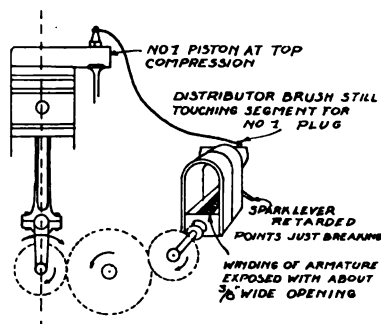


Fig. 3

are the extreme limits of its possible motion, a study of these drawings and a careful comparison with the magneto and motor in your car will enable you to locate the trouble.

C. L. White, N. Y.

Here's a man we're going to treat—"I consider subscription to your paper as essential to my business as gasoline to my engine."

John Tait, Prop., Fairmount Repair Shop, Ark.

Late and early spark—I would like to know what the difference is between a late and early spark.

A. K. Wilson, Tennessee

Replying to Mr. Wilson—A late spark is one that occurs rather late in the cycle or when the piston is going downward, while an early spark is one that occurs when the piston is traveling upward on the compression stroke and ignites the charge before it has been completely compressed—that is what causes the engine to back-fire.

J. S. H., New York.

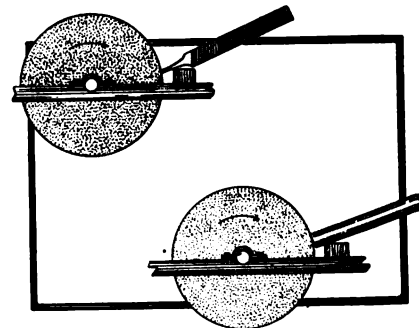
We're strong for Australia—From the letters we receive from our subscribers in the Antipodes we are led to believe that Australian blacksmiths are a mighty "live" lot of men.

The automobile has hardly gotten a foothold in Australia but we will venture a guess that when the automobile comes into more general use in Australia that the Australian blacksmiths will not let anyone "beat them to it" on the automobile repair business.

Has a lop sided grindstone—I have a grindstone that has lost its shape. Can you tell me how I can true up.

O. E. Whitehouse, Illinois.

In Reply—All grindstones work out of true sooner or later. The stone is trued in the absence of a special tool for the pur-



TRUING UP THE OLD GRINDSTONE

pose, by using an old file and a piece of gas-pipe or by using a piece of pipe alone. If the stone is badly out of true, the surface should be turned off with the tang of an old file held firmly on a rest against the face of the stone, as shown. This will quickly remove the high spots on the stone but will leave the surface quite rough.

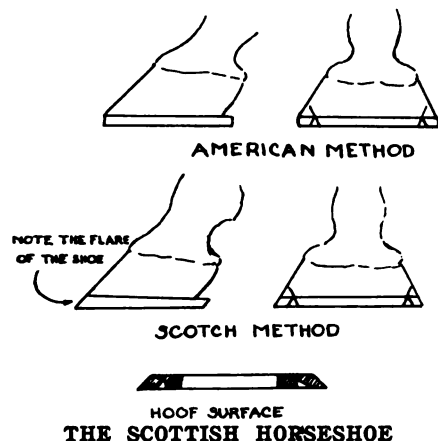
A smooth surface may then be produced by truing the face of the stone with a piece of gas-pipe, the size generally used being $\frac{3}{8}$ or $\frac{1}{2}$ inch pipe. The pipe is held on the rest in the same manner as the file but rolled across the face of the stone.

The stone should revolve in the direction indicated by the rows in both cases.

J. S. H., New York.

A Scottish Horseshoe—Will you kindly tell me how to make a Scottish horseshoe.
F. C. Moore, Oregon.

Replying to the above—In the Scotch method of shoeing it is customary to make the shoe with the lower or ground surface flaring out at the same angle of the hoof, giving the hoof the appearance of being larger than it really is. This is done on the large draft horses exhibited in the



show ring, particularly stallions. The accompanying illustrations will no doubt give you the idea quite clearly.

Most of the Clydesdales and Percherons imported into this country are shod in this manner when received.

The American custom of shoeing is to have the ground surface of the shoe extend no further out than the hoof, to prevent a horse striking or cutting himself with the edge of the shoe. The foreign custom, however, seems to sacrifice this advantage for the sake of appearance.

U. S. Horseshoe Co.

Making Rubber Horseshoes—A recent inquiry for information concerning rubber horse shoes from one of our subscribers revealed the fact, in our investigations, that one of the largest rubber companies, which has hitherto made something of a specialty of this product, has discontinued the manufacture of rubber horse shoes. No reason is given but then you can't stop one from thinking.

An Orphan Engine—I have a 12 h. p. gasoline engine that I bought second hand. I have overhauled it and have it, it seems to me, in A-1 condition and I cannot get it started. It is a two cylinder, two cycle Ellis engine, opposed cylinders, both cylinders firing at the same time. One explosion is all I can ever get. The engine is equipped with Wico Igniter. I have procured a coil, dry battery and timer with no better results.

Squire Stacy, Clayhole, Kentucky.

In Reply—We had difficulty in obtaining full information about the 12 H. P. Ellis which you bought second hand and have been unable to get started. In the first place, you can obtain parts for your engine from the Levene Engine Company, 22 Diamond Street, Philadelphia, Pa., and the Wico Igniter with which it is equipped, is a type 0-2 (or possibly an R-2) made by the Witherbee Igniter Co., Springfield, Mass. The Ellis Co., is said to be bankrupt and to have gone out of business.

You must first check up carefully the wires from the Wico to the spark plugs and make sure that they are not worn

thru or otherwise shortcircuiting anywhere.

Next look over the connections from the carburetor to the engine, making sure that all gaskets are in good condition and tight. The compression also should be tried for each cylinder separately. This can be done by leaving one relief cock open while the other cylinder is tested for its compression.

Make sure that the spark plugs are in good condition. Often a crack in the porcelain so small that it cannot be seen fire. In case of doubt, try a new plug.

To make sure that the spark is properly timed, turn the spark control lever at the top of the Wico so that it is in the notch next to the deep one. In this position the armature of the Wico should just let go as the piston passes top center. The spark will thus be generated and sent to the spark plug. In the position given above, the spark control lever is in its full retard position.

To test the spark ability of the Wico Igniter, hold one of the ends of a spark plug wire about $\frac{3}{8}$ " from the cylinder and crank the engine slowly. As the Wico armature lets go a spark should jump to the cylinder.

'S S New York.

Don't Do It!

Cars are generally so safe and so few fires occur that the motorist is likely to forget the inflammability of gasoline and handle it carelessly. It is unwise in the extreme to use a lighted match for illumination in examining the carburetor after dark or seeking to determine the level of gasoline in the tank. This is often the first impulse where an electric flashlight or trouble light is not available, but such thoughtlessness too often results in destruction for the car and injury to the owner.

From Louisiana—The blacksmith needs all the help that is coming to him. I also want to send you ideas as to my way of business and price list as I am just a little higher than any blacksmith in town on my work and get more than I can do all the time.

G. W. Edwards, Louisiana.

'Let Your Light So Shine'—We have been readers of your paper for a good many years and are always waiting for the next number to come, as there is always something new that we want to learn.

We run a general blacksmith shop and garage, the workshop is 30 by 50 feet and the store room for cars is 24 by 50 feet. We also run the light plant and furnish lights for the whole town.

We would like to know how to case harden soft center lays. This country is very stony and the lays will not scour unless they are very hard and then they sometimes break. We have some trouble with the lays warping in hardening.

Torkildson Brothers, South Dakota.

In Reply—Take a piece of $1\frac{1}{2}$ by $\frac{1}{2}$ inch wagon tire and bolt on the back of the share then heat to a cherry red and sprinkle, while on the fire, with pulverized cyanide of potassium on the face of the share, being careful not to inhale any of the fumes as the cyanide is very poisonous, then plunge into the slack tub edge first. The tire iron on the back will prevent warping. Allow to remain in the tub until cool, remove and finish.

Cultivator shovels can be hardened in a similar manner by heating to a cherry red and sprinkling cyanide all over the face, then let each shovel cool for about $\frac{3}{8}$ " of an inch from the edge and plunge into the tub.

It is quite likely that the cyanide will be found rather expensive at this time but a mixture of two thirds cyanide and the remaining third composed of equal parts of salt and sal ammoniac applied in the same manner as the pure cyanide will give good results, however the pure cyanide is to be preferred.

J. S. H. New York.

Get a Seat on the Band Wagon—I think we will have to get into the auto repair business, as it is taking lots of our other work away. Take for instance, the light horse, buggies, surries, light wagons, spring wagons. All of these have practically disappeared and the auto, in its various forms, is taking their places.

Two years ago I used to keep a man the year around and now I can do all the work alone, with the exception of heavy wagon work, and still have lots of spare time.

Last year was the first auto work I ever did but this year I am planning to do more of it. I have bought an oxy-acetylene outfit, and have done a great deal of work with it already and it has paid for itself.

I am going to put in a line of tires and other staple accessories this year.

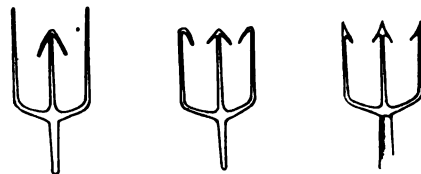
T. W. Kitto, Illinois.

A Question on Forging—I would like to hear from different blacksmiths, their ideas on forging solid steel rings, whether or not tools can be made to forge different sized rings on the steam hammer. We have a great many different sizes to make and I would like to know what other ways there are for doing this besides using the "saddle".

Anxious.

Now we know how it's done—In reply to Mr. John Shaffer's inquiry (of Minnesota) concerning how to make a fish spear, published in a recent number, I will endeavor to give him the correct idea.

First take an old fork with as many tines as he desires and after shaping it to the desired proportions, cut the two outside tines until they are one inch shorter than the inside tines. Then take a piece of iron five inches long and bend



THE VARIOUS STEPS IN CONVERTING A PITCHFORK INTO A FISH SPEAR

around the end of the middle tines, holding in place by gripping with the tongs until welded, then cut off to the desired length. The outside tines can be doubled back on the inside and welded at the point to form the barbs. Do not get too hot and don't hammer unless fork is red hot.

G. M. Copeland, California.

We also desire to acknowledge receipt of similar method of making fish spears from Mr. R. Valliant, of South Dakota.

Another Power Hammer Booster—I have been in California and Arizona for the past year and have not been reading my paper but since I have been back, I sure have been making up for lost time. I think it is one of the best papers published. You referred to the last issue as having something good about the feature, or principal article. I have not received it yet so will write you later concerning it. I see an article in one or two papers about steam hammer work, something which I think is a great big helper in a blacksmith shop and I would like to see more articles about the same as I have been working at a steam hammer for the past year in Arizona. I have found from experience that they are the only thing in the shop for doing nice work and doing it quickly.

I am trying to get the company here to install one. I will say again that The American Blacksmith is a very fine paper for any blacksmith to read for I have found it to be a great help to me in many different ways and I shall write up some points on steam hammer work myself soon that will be of benefit to some who are using or contemplating installing one in their shops.

William Clark, Colorado.

Does it pay to attend to business—In 1895 when I came to this place my father backed me for the tools and a small amount of stock, I think it was about \$87. At this time I was not worth \$300. The place was run down, work going to other shops and it looked like a fright of a place to come to. There were no doors on the shop and the weatherboarding was off in spots and it presented a pretty discouraging sight generally, but I went at it. Now I have a place, a good shop, plenty of windows, lots of machinery and a fine six room house.

Since coming to this place I invested in other things as I was able so I now own 200 acres of land which I bought four years ago for \$4,000. I have been on a farm of which I rent 520 acres, for the last eight years. I bought two farms of 80 acres each last spring for two of my boys when they were married. I have about \$10,000 worth of personal property around me and plenty to look after without the shop. Some seven years ago I sold the shop to another and at the end of five years he gave it up having never been able to settle for it so I bought it back and ran it myself until last July. In the five years that it was in other hands the man owed \$700 he could not pay, to different firms. Booze was the cause.

All that I have, I earned by attending strictly to business and I neither inherited a penny of it nor did my wife.

Henry H. Zimerli, Illinois.

About Refacing Anvils—We sometimes receive queries about refacing anvils that have lost the fluff and bloom of their early youth. Anvils with loose, damaged or worn faces can be replaced at slight expense. Any anvil can be repaired in this manner with the exception of a cast iron anvil which is irreparable. The present price quoted for refacing anvils is seven cents per pound, that is, putting on a new steel face made from the highest grade of crucible cast steel and firmly welded on. Naturally under present conditions the price mentioned is subject to slight variation but in any case would be a great deal less than the present prices of new anvils.

This work can be very quickly done, the anvil being returned to the owner within a day or so after receipt at the factory. However the present demoralized

Realizing that the electrical system is one of the hardest things that the repairman has to contend with we have arranged for a series of articles covering electrical starting, ignition and lighting systems and it looks as though we would begin this series of interesting and instructive articles in our June number.

transportation system will probably make the time of shipping a matter of a week or so if shipped by freight.

An old Friend comes again—Is there any method by which worn out dry batteries can be restored to their original strength, either entirely or in part? I have a number of cells in this condition and I have been told that they can be recharged.

C. I. Friedberg, Pennsylvania.

Replying—This question is an old friend and no sooner does he get knocked out than he comes right back again. There is no way by which the strength of dry batteries can be renewed.

Different "authorities" have advocated punching the zinc shells full of holes and immersing the batteries thus punctured into a strong solution of sal ammoniac. This treatment results in something of an increase in strength which, however, does not tarry long and the battery is soon in its former condition. About the only thing an exhausted dry cell is worth is junk—the zinc usually has a little value if it is not too badly corroded.

S. S., New York.

More on semi steel—The quality of semi steel varies greatly, and the proper method of welding semi steel depends on its particular qualities. Some will be found to be more like cast iron in its characteristics while other semi steel will ordinarily approach the nature of steel in its welding qualities. It therefore depends entirely upon the nature of the semi steel that is to be welded whether welding rods of cast iron or Norway iron welding tire will work best, using welding rod for cast iron where the nature of the metal approaches cast iron or Norway iron when its nature more nearly approaches steel. In practically all other respects the welding is carried on exactly the same as welding cast iron if the metal is more like cast iron, or handled like steel if more like steel in its nature.

C. R. Sutton, Illinois.

Correction—In our February number, under the heading, "Mr. Steinke Describes His Efficient Business System" and ap-

Thanks!

Have just received the March number of your magazine under its new name and will say that I believe you have hit the nail an awful wallop on the head. Am more than pleased with it.

I still have in my possession the first copy of The American Blacksmith of September 1901 and have never had any kick at your magazine in all these years.

I have worked out of the smithing business and into the auto game but the magazine and the old trade still comes handy.

J. B. Campbell, Oregon.

pearing in the "Queries, Answers, Notes" Column, Mr. Steinke makes sundry observations on matters of temperance, and refers to the intemperate habits of the person from whom he purchased his shop.

Mr. Steinke hereby retracts said statement and wants it distinctly understood that he had no intention to injure the reputation and character of the former owner of his place of business, and he hereby publicly states that said statement and accusation was wrongfully made, and should not have been done; and that said statement was made with no intent to injure or defame said party or anyone else.

The paragraph referred to was "blue penciled" and but for the oversight of the printers in the final "make up", would never have made its appearance.

Removing No. 4 Piston—How can I remove the piston and connecting rod from the No. 4 cylinder on a Ford without pulling the engine from the car.

W. L. Hatfield, Oklahoma.

Replying to this question—The bottom plate on the crank case should be removed and you will then be able to loosen the connecting rod bearings. The nut next to the fly wheel is rather troublesome to reach but the proper wrench will bring it. The cylinder head will have to be removed and the piston and connecting rod can then be withdrawn from the top of the engine. The pistons are replaced in the same manner.

S. S., New York.

Making a Generator—I am interested in getting some information in regard to changing a five bar telephone generator into a direct current generator, of six volt, 25 to 30 amperes, suitable for gas engine ignition. My engine is a 2 h. p. single cylinder.

I would say that I propose putting in a new armature shaft on ball bearings, as I have a lathe and tools to handle this work. Would the armature have to be built up of iron disks as in general direct current generator practice or could it be of wood or other insulating material?

The armature is about 1½ inches in diameter. How many slots would be necessary, also how many turns of wire and what size will give the best results. Also what style of winding would be the best?

I am posted somewhat on general winding practice for direct current and also in the construction of commutators. I am doing this work partly as a pastime and will not mind the work necessary for a really successful magneto.

I should have stated that I have a good coil and that this is to be simply a low tension magneto is to take the place of dry cells.

Would it be any advantage to use a small storage cell and run the magneto only as needed or to start on? I use the engine every day but it is not run continuously.

Could the magneto be arranged to start the engine easily and be arranged to slow down by action of a friction governor on the pulley? I propose to run same by either belt or by running pulley on fly-wheel. Also would any instruments be needed on the low tension circuit to regulate the current so as to not burn out the coil.

The engine is of the hit and miss type. What speed would be the most desirable to operate the magneto considering the style and method of winding?

Bert C. Lester, Nebraska.

AMERICAN BLACKSMITH AUTO & TRACTOR SHOP

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ATTEND THIS EXPOSITION

The Automotive and Accessories Exposition to be held in Chicago during the month of September will be a most representative showing of the essentials of the automotive industry; trucks, tractors and accessories.

Every reader of the American Blacksmith, Auto & Tractor Shop should feel that a visit to this exposition will be something of a patriotic duty, as forcibly outlined, the aim of the management is to support and assist the government in the very important solution of the problem of transportation and food production by promoting the wider application of trucks and tractors and their accessories that are coming to be understood as important weapons of offense not only against the Germans in Europe but against starvation generally.

We are heartily in accord with this exposition. We know the men who are behind it—big men, not promoting this show for profit but to assist the government.

Further information on this exposition will be published from time to time and we again desire to impress upon you the importance of your attendance.

THEY COME TO THE RIGHT PLACE

"We have never done any importing but it is our most earnest wish to do so without delay. This important matter has been somewhat neglected for years and thousands of pounds a year have been paid to merchants during the past fourteen years who have charged us heavily for goods, especially during the present war. We now wish to stop this and import all our own goods and now ask your assistance in helping us do so."

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DON'T GIVE MONEY TO AGENTS

The American Blacksmith, Auto & Tractor Shop DOES NOT employ subscription agents. Any person representing himself as such is an impostor and should be so dealt with. Notify us immediately if anyone claiming to represent this journal calls upon you.

OPEN TO SUGGESTIONS

We received a letter not long ago from one of our subscribers, and it wasn't exactly what you would call complimentary; in fact our friend was rather outspoken in his criticisms and the Editor took to heart certain of the criticisms voiced in this letter and immediately wrote a letter in reply, stating that some of the changes suggested would be made at once.

Many of the best features of our magazine have developed from a suggestion or request made by some reader and we hope that we will never get to know so much that we won't be open to ideas from the outside.

Our critic wrote in response to us that he was surprised to hear from us in that way. He needn't have been surprised, for his criticism was sound and his suggestions good.

The Queries, Answers, Notes department belongs to our readers and we want you to use it. Fill it up with pointers that will help the other fellow. Let him see the kind of work you are doing and the equipment you are doing it with; have photos taken and send them in. Put up your questions to this department and we will answer them promptly and satisfactorily.

We want every one of our readers to feel privileged to criticize and suggest and help. With more than twenty thousand contributing editors we would have Some paper, wouldn't we?

THE TENTH ANNUAL CONVENTION of the Blacksmiths, Horseshoers and Wagon Makers' Association of Oklahoma, will be held in Durant, Oklahoma on November 18 and 19. The Secretary of the organization is A. R. Bradshaw, of Okmulgee Oklahoma.



Walt Mason's Essay on Horses

The horse has many pleasing points; he has a lot of useful joints; and he can lope and walk and run, and eat up fodder by the ton. He is a beast of sterling worth—and yet he's falling off the earth.

We used to think him mighty fleet, but now the auto has him beat.

We used to think him very strong; but tractors show where we were wrong.

If you have worked upon a farm, you know where horses lose their charm. I used to work a big bay team, long years ago, and that's no dream. All winter they would loaf and eat, and eat and loaf, and then repeat. And when the winter time was canned, and it was time to plow the land, and I would harness Dick and Ned, my good old father always said: "Be careful, now, don't work too hard! Those horses have a lot of lard; for months they've loafed around the barn, and haven't labored worth a darn, and they are soft as castor ile, so work them gently for a while."

Thus, when we needed speed and haste, the precious time must go to waste. I had to nurse those plugs along, for fear their muscles would go wrong; and when a furlong they would go, they had to stop a while to blow. And how they seemed to drizzle sweat; I seem to see them raining yet. And when I took them to the trough, they'd try to drink their fool heads off, and then the colic they would have, and called for aconite and salve.

And when at last their thews grew strong, so they could labor all day long, the flies got busy on their frames; life was a torture then, by James! Worn out by bites of flies and bugs, they kicked their hind legs o'er the tugs, and reared and pawed and ripped and fussed, and in the equine language, cussed. Thus, through the long, long summer days, they fooled the golden hours away.

What wonder that the thrifty man desires a saner, wiser plan? We take our well tried tractor now, when we go to the fields to plow, or rake the hay or reap the grain, and find that tractor safe and sane.

It isn't soft from over-feed; it isn't cranky like a steed; it doesn't care a whoop for flies; it never tires of exercise. It has no colic, bots or worms; I praise it in my warmest terms.

The Care and Repair of Automobile Starting and Lighting Batteries

Description of Battery

Storage batteries for automobile starting and lighting consist of three or more cells, depending upon the voltage desired. Each cell has an electric pressure of about *two volts*, so that a battery of *three cells* is known as a *six volt* battery, one of six cells as a *twelve volt* battery, etc.

Positive and Negative Plates

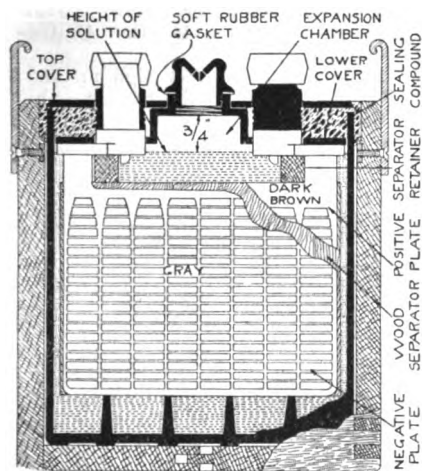
These plates are constructed of hard antimonious lead, in which are pasted what is known as the *active material*, which is the material which undergoes chemical change when the

INTRODUCTION

THE almost universal adoption of electric starting and lighting for automobiles has opened a field of business little thought of a few years ago, but which has grown to amazing proportions.

The sale, care and repair of automobile batteries and starting—lighting systems is now a business in itself and offers splendid opportunities to those who go into it on an adequate scale. It is necessary, however, that those entering this field understand the construction and operation of the storage battery, and that they be equipped to repair storage batteries and the necessary equipment and tools for so doing; in short, such information as will fit you to equip and operate a service station of the first class.

This series of articles is made possible to our readers through the co-operation of the Gould Storage Battery Co., of Depew, N. Y.



SHOWING THE COMPONENT PARTS OF AN AUTOMOBILE STARTING AND LIGHTING STORAGE CELL

battery is charged or discharged. After this active material is pasted into the *grids*, the plates are formed, electro-chemically, the active material on the positive plate becoming *oxide of lead*, and on the negative plate becoming pure *spongy lead*.

Positive and Negative Groups

After the positive and negative plates have been formed, they are built into *groups* which consist of one or more positive plates burned to a connecting strap to form the *positive group*, and two or more negative plates burned to a connecting strap to form the *negative group*. To each strap is attached a post which is used to make electrical connection between the group and an

adjoining group, or the starting and lighting system.

An Element

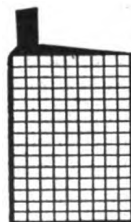
An element consists of a positive and a negative group, the negative group always having *one more plate* than the positive group. Thus a three plate element would have one positive plate and two negative plates, a five plate element would have two positive plates and three negative plates, etc.

Separators

The plates are so burned to the connecting straps, that when the element is assembled, each positive plate surface is adjacent to a negative plate surface, the distance between these surfaces being $\frac{3}{32}$ to $\frac{1}{8}$ inch. The positive and negative surfaces are kept apart by wood or rubber sheets known as *separators*.



POSITIVE PLATE



A "GRID"

A five plate element would thus consist of negative plate, separa-



NEGATIVE PLATE

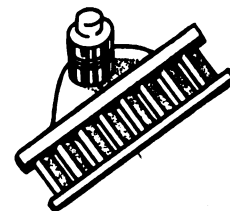
tor, positive plate, separator, negative plate, separator, positive plate, separator, negative plate.

Rubber Jar

The jar is of hard rubber and on its bottom are raised sections or bridges, on which rests the element, leaving space in the bottom of the jar for any active material that may shed from the plates.

Cover

The cover is of hard rubber with an opening in the center for the *vent cap* and an opening on each side for the connecting posts on the positive and negative groups, which are known as terminals.



CONNECTING STRAP

A Complete Cell

A complete cell consists of the rubber jar, the *element* in the jar, resting on the bridges, the *electrolyte* covering the element, and the *cover*; which is carefully sealed to the jar with *sealing compound*.

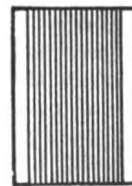
Electrolyte

The electrolyte consists of a mixture of sulphuric acid (H_2SO_4) and pure water, the proportion being about one part of acid to three parts of water. The proportion of water and acid is such that the density of the solution will read 1300 on the hydrometer at a temperature of 70 degrees Fahrenheit.

Complete Battery

The complete battery consists of the desired number of cells assembled in a wooden case,

the cells being connected together in accordance with requirements of starting and lighting system which is to be used.



SEPARATOR

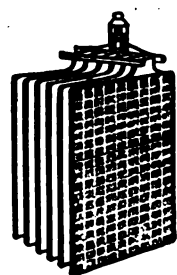
Action of a Cell Under Charge and Discharge

When the cell is fully charged the electrolyte has a density, or specific gravity, of 1300; the active material on the positive plates being oxide of lead and on the negative plates, pure spongy lead. The pressure between the positive and negative groups is about two volts, and if these groups are connected together through an electrical conductor, such as an electric lamp or a motor, current will flow between them, discharging the cell. During this discharge a chemical action takes place which converts the lead oxide on the positive plates and the pure spongy lead on the negative plates both to sulphate of lead. This chemical change removes sulphur from the acid, thereby lowering the specific gravity or density, of the solution. When the cell is completely discharged its density is about 1150.

When current is sent through the cell in an opposite, or charging direction, a chemical action occurs, precisely the reverse of that on discharge. The action of the charging current removes the sulphur from the plates, changing the lead sulphate on the positive plates back to lead oxide, and on the negative plates to pure spongy lead. Inasmuch as the sulphur returns to the solution the solution becomes more dense, and when the cell is fully charged the solution reaches its original density of 1300.

Effect of Overcharging

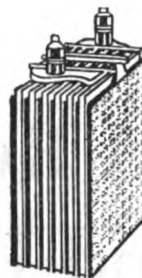
As above stated the charging current changes the plates back to their original chemical formation and when the element is completely charged, the charging current can do no more useful work, its only effect being to convert particles of water in the electrolyte to hydrogen and oxygen gas, which bubbles up violently and indicates that the battery is at, or near, a full state of charge.



POSITIVE GROUP

These gases are also formed in the plates, the oxygen gas in the positive plate and the hydrogen gas in the negative plate, and

there is a tendency for the oxygen gas mechanically to force the lead oxide from the positive plate. This condition is one that is often met with on automobile starting and lighting systems, which are necessarily, set to overcharge the battery, rather than to undercharge it. For this reason the plates have to be particularly rugged.



AN ELEMENT

Under Charging

If the element does not receive sufficient charge the sulphate is apt to harden to such an extent as to be very difficult to remove from the plates. Furthermore, if the battery is allowed to remain in an uncharged condition, a dense, hard sulphate will form on the plates which is even more difficult to remove. This happens to a lesser extent when the battery is fully charged. It is therefore advisable to charge the battery immediately after a discharge and about once a month when idle, even when fully charged.

Heat Formed on Charge and Discharge

When the element is discharged the chemical reactions due to the passage of the current through the electrolyte cause heat to be formed. This heat does not become injurious until the temperature rises to about 105 degrees and it can rise to 110 degrees or even higher for brief periods of time without injury. It is, however, not considered advisable to charge a battery for any length of time after the temperature has risen to 105 degrees. The battery should then be taken off charge and allowed to cool.

Evaporation of Water

Due to heat formed on charge and discharge and also due to *gassing* on overcharge, the water in the solution evaporates, and, as the sulphuric acid does not evaporate, the solution becomes more dense. This evaporation must, therefore, be made up by pure water only.

The amount of evaporation will depend on the temperature and on the amount of work done by the battery, and is therefore, a varying quantity; but a safe rule to follow is to replace the water lost by evaporation every week in summer and every two weeks in winter.

(To be Continued)

NAVAL AVIATION WIDE OPEN FOR YOUR TRADE

Here's a chance to enroll in the United States Naval Reserve force and work at your own trade.

The naval aviation section needs a great number of men immediately. Good ratings and good pay are possible for qualified men. Here is the list of ratings and the Necessary Trades:

Machinists' Mates—General machinists, automobile mechanics and assemblers, toolmakers, diemakers and similar mechanical trades.

Quartermasters—Cutters and cloth fitters, upholsterers, canvas workers, painters, tent riggers.

Carpenter's Mates—Woodworkers of all kinds.

Blacksmiths—Toolsmiths, forge men, furnace men, etc.

Coppersmiths—

Shipfitters and all kinds of sheet metal workers.

Applicants must be American citizens from 18 to 35 years of age. Draft registrants will be accepted upon presentation of a letter from their local boards.

Men of the foregoing trades will be sent to school for special training. Applicants may enroll at 51 Chambers Street, New York, or at any Naval Recruiting Station in the United States.

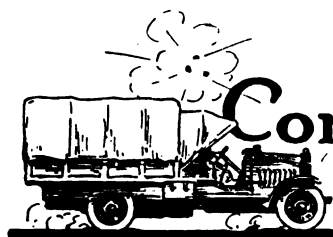
There you are. Now sign up and help the Navy Airboats get the U-Boats.



THIS IS THE LIFE! SERG'T. S. G. S. AND HIS FAT, SASSY AND SATISFIED LOOKING "OUTFIT" (SOMEWHERE IN AMERICA)

CARE AFTER OVERHAULING

AFTER overhauling an automobile motor, tightening the bearings, fitting new rings, and so on, do not use the self-starter until the motor has limbered up, as the extra load caused by the stiff motor may burn it out or injure it otherwise. It is better to crank the motor by hand, or tow the car until it has run enough to allow it to turn freely. Many starters and batteries are injured unnecessarily by failing to do this.



Convoy Workshop Experiences in France



T. Northwood

Approved by British Postal Censorship

WITH the object of giving some little assistance to our American brothers in arms, and also any other automobile repairmen and mechanics, whose privilege it may be to be attached to similar workshops on our battle fronts, I will endeavor to describe the various methods of dealing with repairs and breakdowns with which I came into contact. The same methods may be of service to those whose business it is to remain and "carry on" at home. As I happen to be a knight of the anvil and claim to know a bit about the art of horseshoeing as well as general repair work my remarks will be confined chiefly to the smithing part of the business, which it happened to be my pleasant duty to carry out, and, had it not been for a German bomb which put me out of commission for a while, I might still have been with my old company which I was sorry to part with after sixteen months' service in France.

When a fleet of cars is sent out, either light or heavy, it is the general custom that it be accompanied by a complete workshop mounted on wheels, consisting of a blacksmith's outfit, lathe, milling machine, etc., and a number of skilled mechanics for dealing with accidents or for making the repairs caused by the wear and tear of service and it is to the best interests of all concerned that these repairs be made as speedily and as well as possible, for so long as the car is in the hands of the repairmen it is out of service.

The convoy to which I was attached was composed of fifty new Sunbeam motor ambulances, one workshop truck, complete, two store trucks and one truck for collecting supplies for the convoy.

On our arrival in France, after getting our convoy together, we soon received orders to move up country and as it happened about the time of the "big push" in 1916, our cars were not long in getting to work for in less than a week after their arrival they were clearing patients from the advanced dressing stations back to the hospitals which gave

both cars and men a severe test as some were in operation for 48 hours without a rest.

Headquarters for the convoy is generally arranged at some convenient spot behind the lines where the workshop is accommodated also. In this respect I think we were a bit fortunate as we were mostly lucky enough to find some deserted chateau or farmyard with buildings, which after consolidating with stone or timber, whichever was procurable, made decent accommodations for carrying out the necessary repairs as they came in and the buildings provided shelter and accommodations for the men.

As to breakdowns, I think our cars behaved wonderfully well, considering the state of the roads as at that



THE "SCRAPPY" MOTTO AND EMBLEM
OF UNCLE SAM'S TANK CORPS.

time on the Somme front especially, there were "pot holes" up to the axles everywhere and as no lights are allowed within a few miles of the lines I think there is great credit due the drivers in getting their cars and patients back as well as they have done. Under such conditions the first indication of trouble was the breaking of the dowel pins in the center of the rear springs. As this occurred, each spring was taken out and the leaves thoroughly cleaned and the 5/16 hole was drilled out and a new 3/8 pin was fitted. This stronger bolt gave better results and did not weaken the two-inch leaves to any noticeable extent. Practically the whole of the rear springs of the convoy had to be treated in this

way before I left the convoy. Of course, before assembling again, each leaf received a dressing of graphite and grease to preserve and facilitate the tension of the springs. Later on the front springs began to give trouble in the same way but as these were only 1½ inches wide it was not advisable to fit a larger bolt so new 5/16 bolts were fitted. Most of these needed resetting up and were cleaned and treated with graphite and grease the same as the rear ones. I may say that although the setting up of the leaves extended the life and functions of them they never stand the same strain so well as before. In the course of time these had to be replaced by new ones. At the same time new shackle bolts and axle clips were fitted. These, in most cases being made in our own workshop and fitted for its own particular position. I remember one occasion of the holding down lugs on the axle housing being broken off. Special beveled clips were made to clip around the axle housing and held the spring in position. This made a satisfactory job and lasted about three months on the road every day and was in good condition when a new housing was fitted. If this job had not been done in this manner it would have meant that this particular car would have been out of commission, as we had not a new part in stock at that time. This is one of the great advantages of active service, it makes you think out and make repairs that would be considered impossible in peace times. After a while things began to get a bit more lively in the workshop and in next month's issue I will endeavor to explain how we dealt with broken chassis and crown wheels, which were now giving considerable trouble but were dealt with in such a manner as to enable them to "carry on" and do useful service.

Every family in the United States with a yard can help solve the world problem of food. Vacant lots, too, can be used. Even the smallest kind of a garden will grow something.

The Fordson Tractor

So much has been written and said about the Fordson tractor and so little information of any real value has been given concerning it that we take this opportunity of giving a few facts concerning it.

The first thing to be said about the Fordson tractor is, that it does not use the regular Ford engine. The tractor motor has four, four-inch cylinders with a 5-inch piston stroke. The Ford automobile motor is 3 $\frac{3}{4}$

ignition system, using $\frac{7}{8}$ -inch spark plugs; thermo-syphon and fan cooling system, tubular radiator of Ford design; worm gear final drive; Gurney ball bearings in transmission and Hyatt roller bearings on drive wheel axle; semi-floating drive axle.

The Fordson tractor has no frame, the engine, transmission and other parts being rigidly bolted together so that there is no necessity for the

these tractors will sign an agreement to give his neighbor the use of his machine when he has prepared his own land for cultivation, charging him a reasonable rental for the use of the tractor. In this manner the greatest possible amount of work will be done by each of the 4,000 tractors and it is considered that these 3,000 tractors will make possible the cultivation and harvesting of many additional acres this year that would possibly be unproductive as the result of the scarcity and high wages of farm labor.

The present Fordson tractor plant at Dearborn is a temporary affair and at this time employs about 2,000 men. Eventually a great tractor plant will cover the several thousand acres that the company has bought and this plant is already in course of construction. When this plant is entirely completed and capacity production is reached it is expected, by Ford officials, that 100,000 men will be employed building tractors alone.

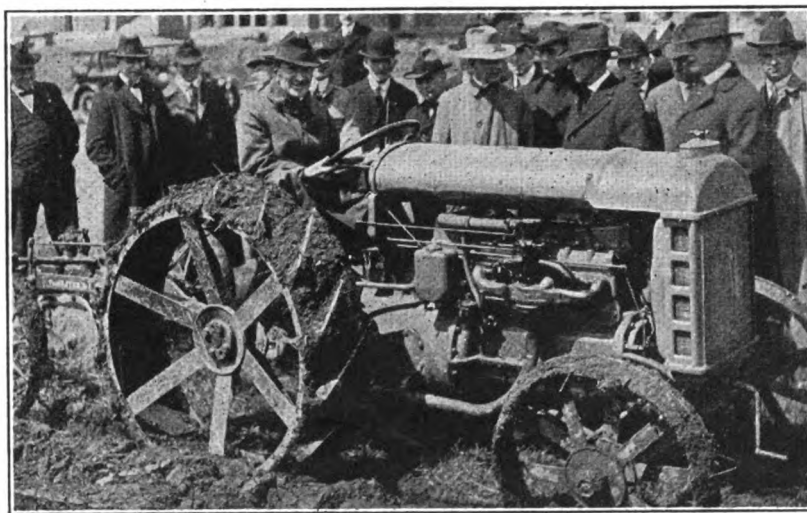
Owing to the lack of present facilities at the Dearborn plant the Ford company have found it necessary to call on other manufacturers for certain castings and other parts but all of these castings are machined at the Dearborn factory. When facilities at this factory become greater it is planned to make all parts entering the tractor under the one roof, from the rough castings to the finished tractor.

It is not known just what the retail price for the Fordson tractor will be to individual purchasers nor just what arrangements will be made for placing this tractor on the market but the general impression appears to be that the price will remain at about that set for the tractors ordered and that the tractors will be placed on the market through the Ford dealers and marketed by the same people who now sell Ford cars.

From things as they look at this time our foresighted readers will be making no mistake in investigating the possibilities of securing such a dealership for themselves.

MILLING CUTTER LUBRICANT

An excellent lubricant for milling cutters can be made by mixing together and boiling for about a half-hour one-quarter pound sal soda, one-half pint lard oil, one-half pint soft soap and enough water to make 10 quarts.



IN ENGLAND THE FORD IS KNOWN AS "THE AMERICAN CAR" AND IS VERY HIGHLY THOUGHT OF "OVER HERE WE CALL IT A FLIVVER AND MEN LIE AWAKE NIGHTS THINKING UP NEW FORD JOKES, SO WE ARE LOOKING FOR THE NEW FORDSON TRACTOR TO CULTIVATE A BUMPER CROP OF ENTIRELY NEW AND ORIGINAL FORD JOKES ALONG SOMEWHAT DIFFERENT LINES.

IN THE ILLUSTRATION WE HAVE H. S. FIRESTONE EXHIBITING HIS NEW FORDSON OUTFIT TO AN INTERESTED GROUP OF FRIENDS IN AN AKRON WAR GARDEN.

bore with a 4-inch stroke. The tractor motor is capable of a speed of 1,000 revolutions per minute and is rated at 22 horse power.

The planetary transmission of the Ford car is displaced on the tractor with a three speed forward and reverse sliding gear transmission — most other tractors have only two forward speeds.

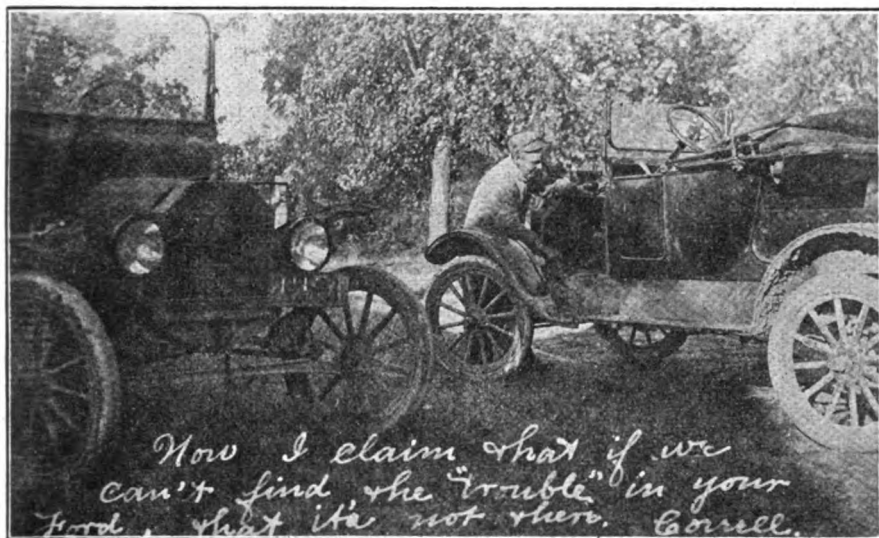
Other interesting mechanical features of the Fordson tractor are: Two drive wheels at rear, two steering wheels in front; turning radius 10 $\frac{1}{2}$ feet; weight 2,500 pounds; four cylinder L-head motor, cast in block; splash lubricating system; Holly vaporizer carburetor; dust strainer of Ford design; high tension magneto

heavy channel iron frame characteristic of most other tractors.

By the end of May it is expected the tractor plant at Dearborn, Michigan, will be turning out 200 tractors a day and 300 daily by December.

The States of Michigan, Ohio, Indiana and Iowa have contracted for 1,000 Fordson tractors apiece which will be delivered to the farmers of these states at \$750 cash, paid on delivery. A gang of two 14-inch Oliver plows, specially designed for use with this tractor will cost \$125 additional, making the total cost of the tractor and plow equipment \$875.

Arrangements have been made whereby each farmer buying one of



AND NOW WE HAVE IT "A YARD OF FORDS."

ABOUT FRED CORRELL

Not long ago we asked Fred Correll, out in Illinois, what particular part of automobile repair work he had the most trouble with and he told us; "I don't work on anything but Fords and don't have any difficulty and want more help."

He also sent us along some photographs that show he is able to take care of anything that is brought to the Correll shop. Not only is he prepared to fix up anything that is brought to him but the Correll Store carries a complete line of auto parts, supplies



IF ANYTHING BREAKS IN LAWRENCE COUNTY ILLINOIS—"TAKE IT TO CORRELL."

and accessories, not to mention the various other lines that are to be found in his stock.

Repairing Defective Carburetors

J. N. Bagley

A leaky carburetor is not only a waste of money in fuel, but it is a source of annoyance when it comes to making adjustments for the height of the fuel in the float chamber cannot be regulated. Some of the time it will overflow, making the mixture entirely too rich and again it will drop to normal and the mixture will be entirely too lean. In event of a leak it will probably be found that one of two things is the fault: a leaky float or a defective float valve. In case of a leaky valve it will need replacing or repairing as shown in Figure 2. The continual working of the valve B in the seat wears the seat as shown at A. This gives so

much surface to the seat the valve will not hold the fuel as it should, and if it cannot be stopped by placing a small screw driver in the end at C and a little fine grinding material on the seat and grinding, it will be found necessary to resort to something else. A seat as shown at D in Figure 3 will be found to hold the gasoline much better for the surface is quite small and a slight tipping of the end at F will not cause a leak, providing the seat of the valve at E is true. A small tool, which can be made by any one having access to a lathe is shown in Figure 4. This consists of a steel

shell with a small extension H to permit of the fastening of a grinding device of some sort. The fluted end will cut the metal away leaving the seat again square and true. To hold the tool in exact alignment, drill a hole into the center of the tool as shown at I and insert a guide pin, J, of just the right size to enter the opening in the seat, A. By giving this tool a few turns the seat will be square and true and it will be a very easy matter to grind the valve until it will hold the gasoline back when the valve is closed. At L in Figure 5 we have a seat badly worn with the tool in position while the cut is being made. Notice the guide at N that holds the tool in position while the cut is being made. At O we have the new seat as the tool leaves it, ready for the float valve to be seated by giving it a few turns with a small screw driver inserted at C as already mentioned. The little valve shown at E in Figure 3, if badly worn can be replaced in the lathe and a fine

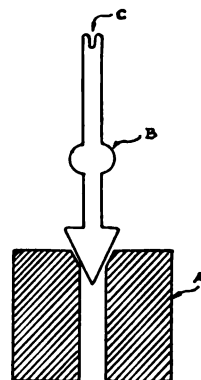


FIGURE 2



CORRELL KNOWS THAT AUTO REPAIRING AND BLACKSMITHING TRAVEL HAND IN HAND.

file applied to the seat while it is revolved at high speed until its true cone shape has been restored, as shown in F. Care should be taken that during this operation the delicate little stem is not sprung as it will be impossible to keep the valve from leaking as this acts as a guide for the valve when in place.

In case the float has become clogged or leaks it will sink to the bottom of

the float chamber, the needle will be raised from its seat and the bowl will overflow. In this instance the float can be removed and replaced or repaired at the option of the user. In case the float is of the cork type it can be cleaned and thoroughly dried out and then given a fresh coat of shellac. Remove the old shellac with sandpaper and place the cork float in an oven and dry well before repainting. After the float has been prepared take a small vessel and place a small quantity of orange shellac in it and take the float as shown in Figure 6 at A with a small wire hooked into the float arm, B, and plunge into the shellac until it is entirely covered. Leave it for a short time in a warm place until it has thoroughly dried before replacing it in the carburetor.

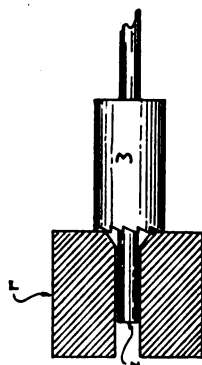


FIGURE 5

In the case of a float of the metal type it must be dried out in the oven just as the cork float after which the hole can be soldered in the ordinary way. In soldering the metal float care should be taken to see that no more extra weight is added than is possible for such float to sink low in the gasoline and overflow the spray

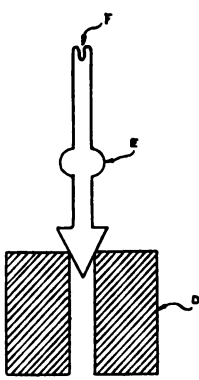
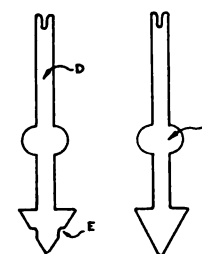


FIG. 3 CORRECT SEATING

chamber, making it impossible to adjust the carburetor and have it render good service. Another point that is likely to cause trouble on the cork floats is the possibility of the small screws attaching the float



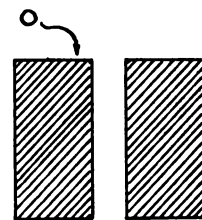
PROPER AND IMPROPER SEATING OF VALVE STEMS.

arm working loose. If they cannot be tightened with a screw driver a new float will be the best remedy.

CONTRACTS IN RESTRAINT OF TRADE

Ralph H. Butz

It happens quite frequently that when an established business is sold the good will and the trade name of the business are also included in the purchase price. The purchaser, in order to safeguard his interests, requires the seller to sign an agreement which specifies that he will not engage in a competing business within certain territory and for a given time. Such an agreement is known as a contract in partial restraint of trade, and if the terms of such a contract are not unreasonable it will be



THE VALVE SEAT SHOULD BE SQUARE AS SHOWN

upheld by the courts. There are, however, some business men who confuse this kind of a contract with another kind, known as contracts in restraint of trade; and acting upon their own interpretation of the legal principles involved they violate their agreements, thinking that even partial restraint of trade can not be enforced by the purchaser.

In many instances the good will of a business is one of the most important assets, and the purchaser of this good will has a legal right to protect himself. He may not, however, make unreasonable and unjustifiable demands of the seller, or impose conditions which would not benefit the purchaser. Thus where the purchaser of a business, which is purely local, being confined to a certain city, should ask the seller to agree not to again engage in a similar business in that state, such an agreement would not be valid, because it would be unreasonable and in restraint of trade. But if the purchaser should demand of the seller not to engage in a similar business within the territory affected, and within a certain time, such an agreement would be valid and would be in partial restraint of trade only.

A case of this nature was decided quite recently in one of the higher courts. In this instance the seller disposed of his real estate, business, trade name and good will. He also entered into an agreement with the

purchaser that he would not, for a period of two years from the date of the sale within the same city; and for a period of five years, within a radius of two miles from this place of business, be or become directly or indirectly engaged in or connected with any similar business, either individually or as a member of a partnership, employee or stockholder of another company.

Three years after the date of the agreement the seller, Johnson, rented a property about two miles from his former place of business and started to equip this property for a business of a similar nature. In this he was entirely within his rights. However, immediately upon again entering in business he began to advertise extensively by various methods and to solicit business within a radius of two miles from his former place of business. In doing so he thought he was acting within his legal rights, because he construed the terms of the agreement as merely prohibiting him from establishing his business within certain territorial limits, but which did not prohibit him from soliciting business within the prescribed area.

Newton, the purchaser, however, contended that Johnson was violating the agreement by doing business within the territory mentioned and asked the court for an injunction to restrain him from soliciting any further business in violation of their agreement. The court upheld Newton's claim and granted an injunction against Johnson. In doing so the court expressed the following opinion:

"We are of the opinion that it is a breach of the agreement to conduct a business similar to the one transferred within a radius of two miles,

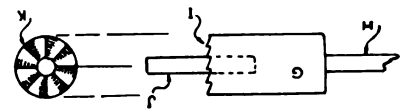


FIGURE 4

or to do acts in violation of the spirit and intent of the contract. The defendant can not be restrained from establishing a similar business, after a period of two years, beyond the territorial limits set forth in the agreement; but the soliciting of business, the selling and delivery of goods to customers within the territorial limits is carrying on business and a breach of the contract.

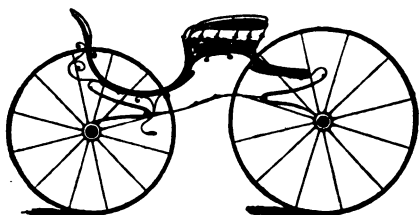
"We need not concern ourselves as to the motive or reason actuating the minds of the parties to the agree-

The Village Tool Smith

ANTHONY ZEMAN

ment as to the limitation of time or territory as therein set forth. As we have already stated, the purpose and requirements of the agreement are perfectly clear, and we cannot read into the agreement any mental reservation or mutual understanding not therein expressed at the time of execution."

The greater number of contracts in partial restraint of trade arise in the sale of what is known as the good will of a business. The purchaser of an established business assumes that the people who traded there will continue to trade there, irrespective of changes of ownership, and this likelihood is known as the good will



A "NEW HAVEN BUGGY" THAT WAS POPULAR IN 1855.

of the business. But when the purchaser executes a contract of this nature he should be sure that it is reasonable; that it does not impose conditions upon the seller which are of no benefit to the purchaser; for if the contract is unreasonable the courts will probably declare it void, leaving him without any protection.

For instance, the purchaser of an established business in an eastern city had the seller agree not to again engage in this kind of business at any time. The court held that the contract was illegal, being in unreasonable restraint of trade. The restriction imposed upon the seller was uncalled for and unnecessary to protect the good will of the business.

The important thing to bear in mind when making contracts of this nature is that a reasonable partial restraint of trade is usually legal, while an unreasonable restraint of trade is always void. Just what is a reasonable restraint of trade is, of course, a question for the courts to decide; but if the purchaser does not impose upon the seller greater restrictions than are necessary he can feel assured that he is amply protected.

(Copyright by RALPH H. BUTZ.)

In 1896 Barnum & Bailey announced that they would exhibit throughout the country a horseless vehicle.

In July, 1898, the news is given that a plant would be built to turn out one motor carriage a week.

Along with the general work, we often meet with a streak of steel work. It is most strange how deceiving the steel will prove in many ways, for instance, to sharpen a cold chisel would seem but a trifle compared with the general run of business and just such trifles will often decide between success and failure. As some will fail to realize what the little cold chisel may in time bring, or take therefor it is best to treat the little object fairly. To be fair with similar tools a little knowledge in the nature of steel is required. As a rule some will take the hardening to be the principal point where as far as workmanship is concerned that may be divided into three principal points. To illustrate them, the first is proper heating, the second is proper hammering and the third is the hardening. It seems that the last point is the most abused, as whatever the tool, as soon as it fails the blame is generally laid to the hardening, even though the hardening had absolutely nothing to do with the failure of the tool to "stand up."

To sharpen a cold chisel seems quite simple, considered from the point of the labor required, but it is far from being so when it comes to the matter of durability. So long as a chisel is defective to any extent it is almost worthless as it will only serve a limited time. To sharpen a chisel that will give an unlimited amount of service it must be provided with resistance. The proper resistance is applied to a chisel by proper heating and proper hammering, the hardening being merely applied.

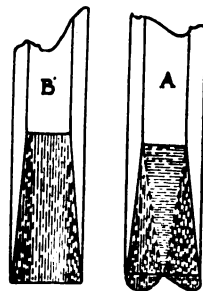
Referring to proper heating. It is not in all cases that overheating is the cause of defects as there are a greater number of chances that the tool has not been sufficiently heated. To illustrate the nature of a tool that has been insufficiently heated, is where it has been heated too quickly, as in such cases the steel appears to be sufficiently heated when, as a matter of fact, it is only affected on the outer portion, the center of the steel not having attained the same degree of heat as the outside. The consequence is that such a tool will be harder on the outside than on the inside when it has been hardened or in other words unequal contraction will be caused which will act against

itself and which lowers the resistance of the tool and increases the chances of breakage.

To avoid similar difficulties where the common forge is used, especially one operated by the modern electric blower, is to provide a damper in the air pipe leading from the blower to the forge. In this way it is possible to control the amount of draft required. The electric blower is usually provided with a switchboard for regulating the amount of the draft but this is only sufficient to a small degree, as steel working requires a finer adjustment than is possible to obtain by this means.

Referring to the point of proper hammering, this is the most deceiving of all as some will approach it by using whatever style or weight of hammer that happens to be at hand, the consequence is that the tool will come out just as it was worked out—not as it should be but as it happened to be.

To apply a hammer blow on a piece of steel the weight of the hammer plays an important part, as the heavier the hammer the better the quality, as the blow must affect the steel thoroughly. Some writers describe this as working the steel from both sides. In such cases a heavy tool may be worked equally from both sides and either side will not affect the center of the tool, the consequence being that when the tool is quenched the unequal contraction mentioned will occur



where the tool was not sufficiently heated. To obtain the best results dead, heavy blows should be used rather than light, sharp ones. Distributing the weight of the blows throughout the whole tool also depends upon the starting point: for example some will start by edging the tool. In such cases the tool becomes thicker along the edges and the corners are forced forward when being worked from the flat sides the blows will naturally affect the edges first, consequently the tool when drawn out to the desired point will be far longer at the

corners of the blade than at the center, which shows plainly that the effect of the blows were greater on the edges than they were through the center. Since there is an equal amount of stock in the tool at the starting point why should it be lacking in the tool at the center of the blade after being finished? The question points to improper forging, as one may take the same tool and proceed in sharpening by first reducing it in thickness through the center, then apply a heavy blow or two on each side of the edges thereby forcing the center of the tool to the desired length and at the same time distributing the effect of the blows throughout the entire blade.

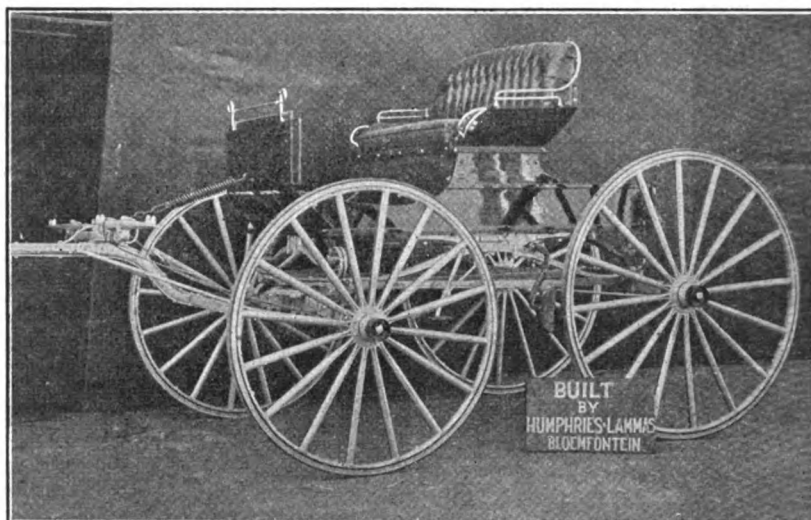
When the chisel has been properly treated to this point it is well to allow it to cool and then reheat to the desired point and harden. For the past ten years I have sharpened large numbers of granite cutters' tools such as axes and similar tools and I have found that my methods seldom fail.

TESTING DRY CELLS

The usual method of testing the efficiency of a dry cell is to place an ammeter in the circuit. Should one of these instruments not be at hand, a rough estimate of the condition of the cell can be obtained by attaching a wire to the zinc or shell terminal of the cell and then touching the carbon element lightly with the free end of the lead. If a small puff of smoke arises on contact, it is safe to assume that the cell is in good condition. If the contact produces only a black ring on the surface of the electrode, it is an indication that the cell is nearly exhausted.



IT'S THE LAST PARAGRAPH THAT BRINGS RESULTS.



BESIDES MEANING WHAT YOU THINK IT DOES, U. S. A. STANDS FOR THE UNION OF SOUTH AFRICA WHERE AUTOS ARE FEW AND FAR BETWEEN, AND THE CARRIAGE BUILDER WAXES FAT AND FLOURISHES AFTER THE FASHION OF THE BIBLICAL GREEN BAY TREE. THE ILLUSTRATION SHOWS A RUNABOUT BUILT BY MESSRS. HUMPHREYS & LAMMAS FOR THE DUKE OF WESTMINSTER ESTATE. IT IS EQUIPPED WITH TIMKEN ROLLER AXLES.

BREAKING IN A NEW TRACTOR

Before attempting to operate the tractor carefully study the instruction book that is usually packed with the tool equipment.

Go over the tractor thoroughly until you understand the working of all the levers and what they are for.

Make sure that you locate all the grease cups and oil cups and see that they are clear of any dirt or cinders. Fill oil cups and compression grease cups and turn down at least one compression grease cup full of grease into each bearing and then fill the cup.

If the tractor is one of the type that has an open differential make certain that oil is reaching all of the several bearings that it contains, also look over the wheel and axle bearings.

Whenever possible use the brand of gas engine oil recommended by the manufacturer and be sure to note the quantity of oil in the motor crank case and if it is not up to the proper level put in enough to make the indicator show well above the running level—too much oil is better than not enough by far.

Fill the fuel tanks and the radiator.

The bearings of the new tractor should be inspected about every mile and at each inspection the grease cups should be given a slight turn.

Be very careful in giving the tractor its first "work-out" for more damage can be done to a new tractor than two years of service will produce. If the load is applied too heavily a bearing may be scored or a

journal scratched while it is yet tight and give no end of trouble by always running hot. This causes lost power.

Roller bearings are no guarantee against bearing troubles and they must be cared for just as much as any other bearing. It will require about a week of careful use before the tractor will develop its full "pep."

Take as much care of a tractor as you would of a horse which, in the case of a tractor means, keep it supplied with grease and sheltered when not in use.

When putting the tractor up for the winter if it is not desired to use it for other work give it a coating of heavy oil to prevent the formation of rust—this will prolong the life of the tractor and prevent troublesome breakages and delays when the machine is needed.

DRILLING HARD STEEL

The following preparation will aid in the drilling of hard steel used in automobile construction. Mix one part spirits of camphor with four parts of turpentine. After the mixture has been applied to the part to be drilled and allowed to dry an ordinary drill may be used.

CAUSE OF CLUTCH SLIPPIN

When the clutch is located in the flywheel of a motor, especially the high-speed motor, a rear bearing with a little "shake" or lost motion may cause the clutch to slip. Very little play in the bearing will cause vibration, and this in turn causes the clutch to slip.

GATES OF THE GOTHES

JOHN Y. DUNLOP

With the introduction in Gothic England of domestic magnificence and extravagance, we see the art of the smith suddenly blossom out and become a very highly developed craft indeed. But it was due to the importation of the foreign worker that we owe this change.

At that time all the great churches vied with each other in the erection of gates and screens of the richest tracery.

The example shown in the folding door is forged with a Gothic head with equilateral Gothic arches between the rails.

While there is reason to believe that this gate was executed by a foreign smith, English workers were not slow in taking advantage of the

opportunities which such circumstances put in their way at that time.

In these days of so little account was the craftsman held that from records of payment which have escaped destruction, the names of a few of the craftsmen have been discovered.

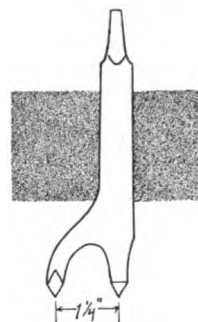
If great names were not made certainly great fortunes were not amassed and it is to be feared that the cleverest of them did not earn any more than a bare living as a reward for their skill and enterprise.

PACKING GASOLINE PUMPS.

About the best material to use in the stuffing box of a gasoline pump is hemp string and soap. Gasoline will dissolve practically any kind of oil used as a lubricator, but it has no effect on soap, so that soap may be used in place of grease as a lubricant or in place of red lead in making screw-joints tight.

A WHOLE FLOCK OF IDEAS

A 1912 Metz car came to me some time ago with the threads stripped from one of the rear axle shafts. I drilled a quarter-inch hole in the end of the shaft for about an inch and then using a punch I swelled the end of the axle. This was repeated with a larger punch until the end of the shaft had been enlarged sufficiently for the nut to hold. This job was so satisfactory that the owner was saved the price of a new axle.



FOR CUTTING
IRON WASHERS

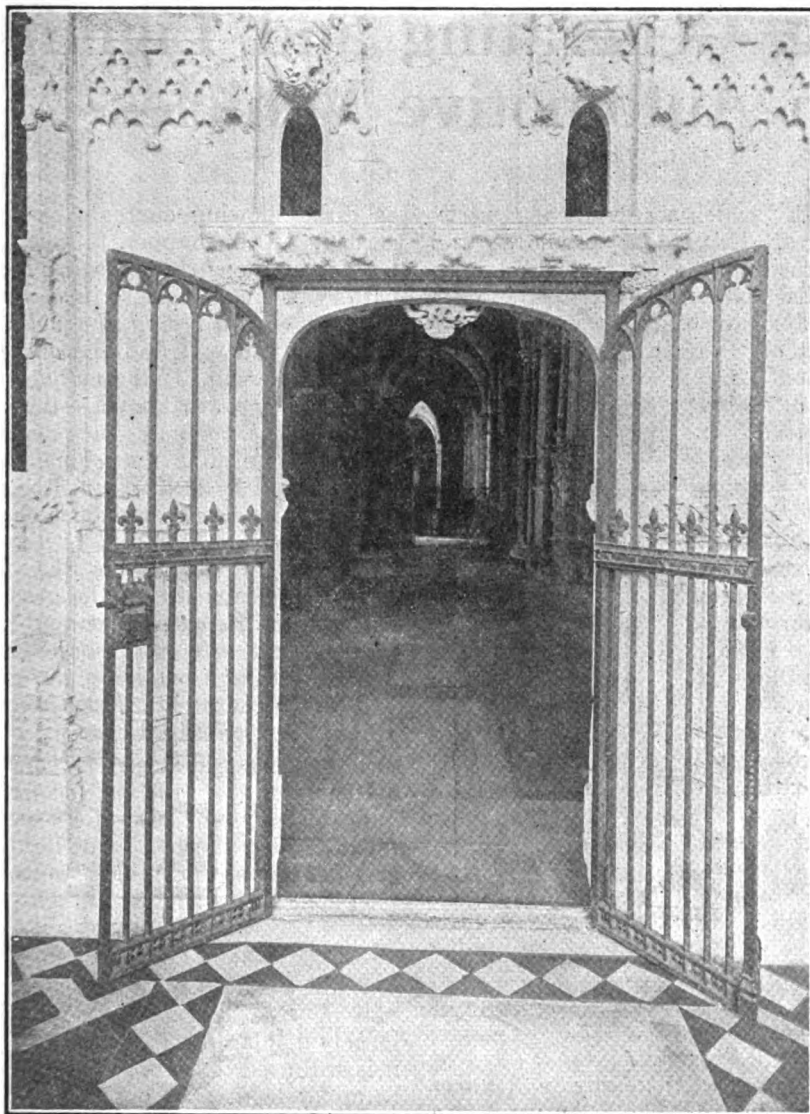
In fitting a nut to an oversize bolt and you have no way of making it smaller you can make the nut larger by putting a piece of brass wire in one of the flutes of the tap and run the tap through the nut. By using the proper size wire it is possible to thus secure a very good fit. I have tapped 9-16 with a 1-2 tap. It takes a little practice and you have to be careful or you may break the tap. I have used this scheme for a number of years with good success.

I also use this scheme with a fluted reamer to make a hole a trifle larger than the diameter of the reamer. It is a good idea to flatten the wire a trifle so that it will not roll and bind. I sometimes use two or three wires, one in each flute. Of course this applies only on thin pieces and would naturally enough not do in all cases.

I had some washers to make recently from 4 by 8 inch flat stock and having a 2 1/2-inch hole. The boss said to cut them out with a cold chisel but I told him that I could make a better job of it with the tool shown in the illustration. You can see by the shape of the tool how it worked and it made a great deal better job than a cold chisel. If properly forged the same tool can be made to drill several different sized holes by bending the cutter in or out to vary the size of the hole. A drill of this sort has to be run very slowly or the temper will not stand and the thinner the cutter can be made the less metal it will have to remove and the faster it will cut.

U. G. NEALE, *Connecticut.*

At the present time there are 130 different firms manufacturing some 200 different varieties of tractors—WATCH IT GROW.



ALL THE GREAT CHURCHES VIED WITH ONE ANOTHER IN THE ERECTION OF GATES AND SCREENS OF THE RICHEST TRACERY. AN EXAMPLE OF EARLY GOTHIC WROUGHT IRON WORK IN AN OLD ENGLISH CHURCH.



THE WIFE OF A CARELESS MAN ALMOST A WIDOW.

MUFFLER PAINT

It is difficult to find a satisfactory paint for the exhaust pipe and muffler, because of the heat of those parts. Here is a highly recommended muffler paint: Boiled linseed oil, one-fifth pound; Japan varnish, one-fifth pound; turpentine, two-fifths pound; lampblack, $1\frac{1}{2}$ ounces; powdered graphite, $1\frac{1}{2}$ ounces; powdered oxide of manganese, three-eighths ounce. Mix the linseed oil and Japan varnish well together, then add in order, stirring all the time, the lampblack, the graphite and the powdered manganese. Add the turpentine, until the quantity mentioned has been used. This mixture should be used as soon as it is mixed, as it dries quickly. Every time the brush is dipped in it should be stirred. It is well to paint the muffler while it is hot, after having cleaned it thoroughly.

Ignition, Starting, Generating and Lighting Systems on Automotive Vehicles

C. L. WHITE

Electricity

This mysterious "form of energy" can best be understood, as far as its direct flow and measurement is concerned, by comparing it to the flow of water in pipes. The wires are the pipes and the switches and breakers are the valves. Batteries may be likened to pumps, the dry cell being "wound up" at the factory while the storage battery can be "wound up" by a flow of the water (electricity) passed through it "backwards." In the same way, generators and magnetos are a sort of combination of condenser and pump,—the water (electricity) being found in the condenser (generator or magneto) in the form of steam (magnetism) and being changed by the action of the condenser (magneto or generator) into water (electricity). These latter devices will be more fully discussed in later articles.

The most simple unit of measurement of electricity is the *coulomb*. It is the imaginary unit of quantity and is like the gallon. No one seems to have been able to get electricity to stand still long enough in the open air to be able to dish out a coulombful and so we have to measure it as it flows. When a coulomb flows past per second we call this "flow of current" an *ampere*.

The next unit of measurement is that which measures the "force" or

"push" which a current of electricity has. This is the "pressure" and is measured in *volts*. It is also known as Electro-Motive-Force (E. M. F.) and for purposes of comparison we speak of "high tension" and "low tension" and also of "high potential" or "low potential" which you understand means the same as high pressure or low pressure when speaking of water.

The last unit of measurement we need to know about is that of "resistance" which is called the *ohm*. In the case of water flowing through pipes, it would be the friction of the curves and internal roughness of the piping and also the size of the pipe.

These three units always have a fixed relation to each other as far

as direct flowing currents are concerned. If you happen to know the *voltage* of the current flowing into a battery or a coil and also its *ohms* resistance,—by *dividing* the *volts* by the *ohms* you will find the *amperes* that are flowing. If the *voltage* and the *amperage* are known,—then by *dividing* the *volts* by the *amperes* one can determine the *ohms* resistance. And by *multiplying* the *amperes* by the *ohms* we at once obtain the *voltage*.

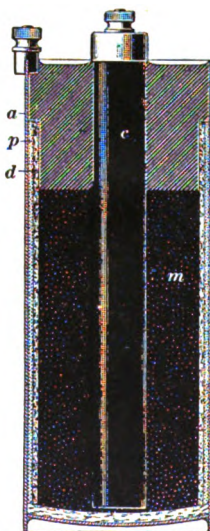
Before starting in on the first source of electricity on the gasoline automobile, the battery, it may help to mention the fact that besides the dry and storage batteries, the magneto and generator are also *sources* (pumps) of electrical energy.

The *needs* for electricity on the automobile are *ignition*, *cranking*, and *lighting* and also for special purposes like horns, cigar lighters, grip warmers, carburetor warmers, telephones, spot lights, signals, etc.

BATTERIES

The Dry Battery

While the need for a battery which will operate a cranking motor has largely displaced the dry battery yet it is still used extensively and should be understood. The positive or plus element (the discharge side of the pump) of a dry cell is a carbon post in the center. This is surrounded by a "mix" made up largely of



A-ZINC CAN P-LINING OF ABSORBENT PAPER D-LAYER OF WHITE PASTE. C-CARBON CATHODE M-"MIX."

PERSONAL experience in teaching men the principles of operation, care and repair of all types of automotive vehicles together with personal experience in the application of the principles taught has led us to realize that the electric systems are the most difficult for the average man to understand and consequently they give him the greatest trouble to maintain in correct adjustment, they do not receive proper care with the result that there is too frequent need for repair and replacement.

To begin with, the reader must not go into a study of these systems thinking that they are really hard to understand. They are the most difficult part of the car to understand, it is true; but the secret in understanding them lies in going into this study with an open mind and in trying to master first the principles back of the operation of each part.

It is the object of this series of articles to teach principles first and the application later. Unusual technical terms will be avoided as much as possible and many of the analogies and illustrations will be taken from everyday life and experiences.

To get the greatest good from this series the reader should make personal applications of each principle studied by careful study of the nearest available apparatus—whether on an automobile, motor truck, motor boat, motor cycle, tractor or airplane engine.

The subject matter of the series will be taken up as follows,—

Electricity	Magnetos
Batteries	Motor Principles
Ignition Principles	Motor Circuits
Ignition Systems	Motor Systems
Vibrator	Generator Principles
Non-Vibrator	Generator Circuits
Unit coils	Generator Systems
Master vibrator	Lighting Circuits
Distributor	and Systems

Note,—Motor means the cranking motor.

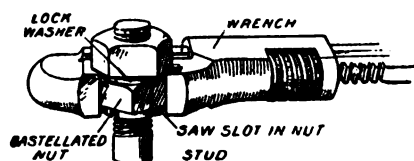
carbon, sal-ammoniac and dioxide of manganese. All being contained in a zinc can which in turn is in a pasteboard can. The zinc can is the negative or minus element. There are suitable screws on each element, called terminals, to which the wires are attached. The potential difference between these elements is $1\frac{1}{2}$ volts (approximate) which is called the voltage of the cell. This means that this little electric pump will pump electricity up to a pressure of about $1\frac{1}{2}$ volts.

But we need at least six volts to get the best results. We will tell you how we get this greater voltage in the next issue,—watch for it.

It takes a lot of money to run a private banking business in connection with the blacksmith business.

REMOVING STUD BOLTS

I had occasion to remove a stud bolt the other day which came near causing me to use some strong language. I doubled the nuts on it but they would slip and turn together before they would start. Finally I chose a castle nut the same size and screwed it onto the stud, first having sawed through one side of the said nut. I ran it down upside down. I then put on a heavy lock washer and then another nut. Taking a monkey wrench I adjusted it to the split castle nut and screwed the adjustment on the wrench tight with a pair of pliers, the jaws of the wrench being positioned on the nut in such a manner as to close the slot slightly. I then ran the upper nut down until the lock washer was compressed flat against the lower nut, then began to turn the wrench and the stud began



TO REMOVE A STUD BOLT

to back out. I was careful to select a new castle (or castellated) nut and believe the sharp threads cutting into the valleys of the stud assisted materially in forming a clamp.

RAY E. SCHWARTZ, Arizona.

PAINT FOR CYLINDERS

Mix two pounds of black oxide of manganese with three pounds of flake graphite and nine pounds of Fuller's earth. Then add a compound of one part of glucose, ten parts of sodium silicate and four parts of water and stir until the entire mixture forms a paint-like consistency. The paint thus made is good to use for painting automobile cylinders and the exhaust manifold.

MENDING BROKEN RUBBER

Broken hard rubber articles can be mended by using a cement made by dissolving one part of gum camphor in four parts of alcohol, and adding an equal weight of shellac. The cement should be applied warm. Pressure must keep the broken parts together until the cement is dry. Equal parts of gutta percha and asphaltum, melted together, also makes a good hard rubber cement. This mixture must be applied hot and the broken parts must be held together while it is cooling.

Benton's Recipes

Cleaning Window and Plate Glass—There are many things offered for this purpose, perhaps the simplest being to use benzine. One solution recommended for this purpose is made of benzine and burnt magnesia made to a paste-like consistency. This is spread over the glass with a wad of cotton or a soft brush, rubbing it on thoroughly and then rubbing it off again. It is supposed to take with it all the grease, paint and putty.

Cheap Flowing Solder—A cheap soft solder which is good for purposes where not much pressure is carried, is made by adding to each pound of lead, while melting, one teaspoonful of common salt.

Cold Solder—For flux use 1 part metallic sodium to 50 or 60 parts of mercury. These combine if well shaken in a bottle. For solder use a weak solution of copper sulphate, about 1 ounce sulphate to 1 quart of water; precipitate the copper by rods of zinc, wash the precipitate two or three times with hot water, drain off the water and add 6 or 7 ounces of mercury for every 3 ounces of precipitate. A trifle of sulphuric acid will assist in the combining of the matter. The combination will form a paste which sets very hard in a few hours.

Improved Soldering Acid—A very satisfactory soldering acid may be made by the use of the ordinary soldering acid for the base and introducing a certain proportion of chloride of tin and sal-ammoniac. This gives an acid which is far superior to the old form. To make one gallon of this soldering fluid, take three quarts of common muriatic acid and dissolve as much zinc as possible in it. This, as is well known, is the common form of acid used in soldering. Next dissolve 6 ounces of sal-ammoniac in a pint of warm water. In another pint dissolve 4 ounces of chloride of tin. The three solutions should then be mixed together. After mixing, the solution may appear cloudy, and can be cleared up by a few drops of muriatic acid, care being taken not to add too much. The acid is used in the same manner as any ordinary soldering fluid. It will be found that it will not spatter when the hot iron is applied, and also that a cheaper grade of solder may be used with it, if necessary.

Soldering Small Work—When soldering two small awkward-shaped pieces together, they can be held in position by pressing slightly into a piece of damp clay. When the work has several soldered joints it can be buried in sand or covered with clay to confine the heat to the part being operated on. A small blowpipe or blow-lamp is preferable to using a soldering bit.

Soldering Paste—A good paste for use where soldering acid would be objectionable is composed of the following ingredients: Ammonium chloride 25 per cent; alcohol (wood or grain) 25 per cent; common vaseline 50 per cent. The ingredients are thoroughly mixed before the paste is used.

To Braze Steel and Iron Without Heat—To braze steel or iron without heat take $\frac{1}{4}$ ounce fluoric acid, 2 ounces of brass filings, and 1 ounce of steel filings. Put them all into the fluoric. Touch each part of the work with the mixture, and put them together. Take care that the fluoric acid is put into an earthen vessel.

EVEN AS YOU AND I

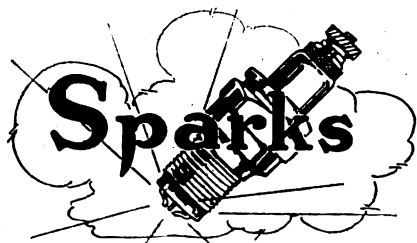
He looked not to the left nor right,
But always straight ahead;
Nor did he listen, as one might,
To what was being said.

His face was pale, his lips were set,
As tho' they ne'er had smiled;
Upon his brow were beads of sweat,
His eyes were staring—wild.

Coherently he could not speak,
His mutterings were profane;
He'd wave his arm and fairly shriek
As though he were in pain.

The people passing paused to look,
Some pityingly, but
More laughed at him, while others took
The stand he was a nut.

One moment he'd be all alert,
The next, but half alive;
He'd crawl along and then he'd spurt—
He was learning how to drive.
—H. S. Osborne.



The message from "over there" is come across."

No news is good news, provided you are an optimist.

Don't scrape an acquaintance with a man by rubbing him the wrong way.

Silence is golden. It is easier to leave a thing unsaid than to try to unsay it.

Where a difference of opinion is concerned it is just as well to split the difference.

A man's word may be as good as his bond but that doesn't go with the Liberty Loan.

When the chronic borrower puts in an appearance you can always try offering him a little advice.

Flatter a woman's vanity and it tickles her heart. Flatter a man's and it opens his pocket book.

Wisdom takes the flip out of flippancy. Even the trout of mature years has little respect for the fly youth.

A bad penny always turns up, but it generally turns tail.

Remember that every Liberty Bond or War Savings Stamp is a bottle of nerve tonic for our boys over there.

Always finish the job. It's when a fellow is half shot that he is apt to be fired.

It's all right for people to say nothing and saw wood, but we want to see the wood they saw.

You never can tell. Even the man who is his own worst enemy may have plenty of other friends.

The compliments of some people fall flat, but the average person will fall for flattery.

Well, how about that picture of your shop that you have been going to send us?

With the present price of bread it's no wonder most people are out for the dough.

The average blacksmith is content to strike while the iron is hot but the baseball player often takes three strikes.

We haven't heard anything about you or your shop in a coon's age—come on across with it.

The best advertising you can give your competitor is to "knock" him.

When someone stops advertising someone stops buying. Get acquainted with your local editor and his staff it will pay you.

Radiator—the large flat thing in front of the car resembling a bee's boarding house, and which generally ought to contain water when it don't.

The experience of others in the same line of business should be worth a great deal to the wide awake business man. That's why your own keen observation and your trade paper are of inestimable value.

The next time one of your friends comes snooping around your shop with his Kodak get him to make a picture of your shop and then—send it to us.

Clutch—the big, round thing under the foot board that should be put to sleep before you exercise the gearshift.

You like to hear what some other fellow is doing, don't you? Then why in the name of by golly and by heck don't you give the other fellow a chance to hear something about yourself—c'mon be a sport.

If one of your customers does business with your competitor once in awhile—which he has a perfect right to do—don't act sulky when he comes back. That is the surest way to play into your competitors hands. Ignore the fact that the customer has gone elsewhere. It is none of your business anyway, but treat him so cordially, so courteously, render such interested service and sell so much satisfaction that he will not want to go elsewhere.

Have you decided yet that the automobile and tractor repair business is worth while?

Make the most of your opportunities and if necessary, make your opportunities.

While we're at it you are passing by a big bet if you don't look into the possibilities of securing an agent or sub agency for the Fordson tractors.

The tractor is going to revolutionize farmers and farming as well as another business that we can think of without any trouble.

Michigan, Ohio and Iowa have bought 1,000 of the Fordson tractors apiece. These tractors will be sold to the farmers at cost \$750. Can you figure out what this is going to mean to you? The worst is yet to come, too.

Friends are a business asset. The more you have, the richer you are in every way. A business man cannot afford to be a hermit, a recluse or a grouch. Be friendly and make friends.

Gears—A testy lot of little wheels that must be quickly humored when they grind their teeth.

Prompt action in sharpening and repairing farm implements during the busy season will do a lot to keep down the number of farm shops that spring up for this kind of work.

Keep your brain working by reading all that's up to date in your business and get new ideas.

Do not think that you and you alone know all there is to know about your business. Frequently someone will give you suggestions which are wise to consider or will make complaints that will be money in your pocket to investigate.

A South Dakota blacksmith prominently displays this reminder to the customer

Proverbs of Solumn

WOE unto the smith who growls and whines continually. He lacketh the spine of a man, and shall inherit many troubles which never happen.

Collection of bills deferred maketh the purse sick.

The smith who slighteth his work for the sake of profit cutteth holes in his own pockets.

He that harkeneth to the voice of the deadbeat shall be sorely beaten. Yea and with many profitless stripes.

Will Bishop

"Cash is paid the farmer for his produce. Don't you believe in a square deal?"

Valves—A sort of trap door invention with springs that are rather tricky and really belong in the recoil-action of a cannon.

Remember that nothing succeeds like success—and so a clean shop and a clean person and a public spirited interest in the welfare of your community are all splendidly worth while.

Never neglect an opportunity to have your name appear in a favorable manner in your local paper.

Make your name so well known and popular that whenever anyone thinks of work in your line they will think of you.

Drip Pan—The place where you hunt for your favorite cotter pin.

It begins to appear that the chaps who "can take a drink or leave it alone" will presently discover how it feels to leave it alone.

Old John Barleycorn and the Kaiser have several points in common, the strong est being that both betray those who put their trust in them.

The easiest way to get rid of a crowd is to take up a collection.

A broad minded sermon by a long winded parson may be as broad as it is long.

The only time many a fellow is lucky at cards is when he lets them alone.

Even when a fellow can't see a future ahead of him he can see his finish.

Any man can view trouble calmly provided it isn't his.

All the White lies are not to be found on tombstones.

You never can tell, some men die hard and others are dead easy.

It doesn't do much good for a drowning man to clutch at strawberries.

The best man in an argument is the one that makes the other fellow hunt for the proof.

We all have our ups and downs. Merely being a high liver has laid many a man low.

Adam had no ancestors but that didn't prevent him from having a lot of trouble with his family tree.

"I like to take my own time," said the bore. "That's all right but don't take mine," warned the busy man.

About the only fellow for whom there is no room in the army is the one who feels he is too good for his job.

The dentist's victims quite agree with him that his work is "an awful grind."

The only man we ever saw who was as dignified as some men try to be was an actor taking the part of a butler in a play.

Some people think that a bachelor hasn't a single aim in life whereas some bachelors have a single aim not to double up.



GEORGE A. DECHANT.

Food for thought among dealers entering the tractor business—

First of all, the dealer intending to sell tractors to farmers should familiarize himself reasonably well with belt driven machinery generally used on farms. There are—silo fillers, feed mills, corn huskers, hay balers, threshers, clover hullers, and sometimes stone crushers, lime pulverizers and other equipment. The reason for the above is that a tractor intended for field work on a farm should have a motor of sufficient brake horse power to drive the size machinery already on the farm or that which is urgently needed and likely will be purchased. Take, for example, an ensilage cutter with a 16-inch or 18-inch knife cylinder, and with a blower attached, requires 25 to 30 horse power. It cannot be driven successfully with the best of the many two-plow tractors. If the farmer owns a feed mill or a thresher which will take approximately the same amount of power that the above size ensilage cutter requires, it would be wasteful to discard all of his belt driven machinery for new and smaller sizes to be able to drive them with a small tractor. The city dealer knows perhaps very little about the various kinds of farm tools or the power required to operate them. To talk intelligently to a farmer regarding a practical size tractor for him to use, the dealer should know something about the amount of power required to operate the various sizes of power farming machines. He should remember that a given size machine may require considerably more power when numerous attachments are added. A blower added to a medium sized cutter may require four to six horse power more than the same machine fitted with a slat and chain elevator.

To assist those of our readers who are already selling tractors or those contemplating entering the field with authoritative and helpful sales and service information, Mr. Dechant, Advertising Manager of the J. I. Case Threshing Machine Co., has been called upon and has "rallied" with an article that should be of great value to all who are interested in the sale and application of tractors.—Editor.

Then, a windstacker and a self-feeder, weighing bagger, etc., added to a medium sized thresher (28 x 50), handling long, tough grain, will require about fifteen horse power more than if operated normally with hand feed table and common slat stacker.

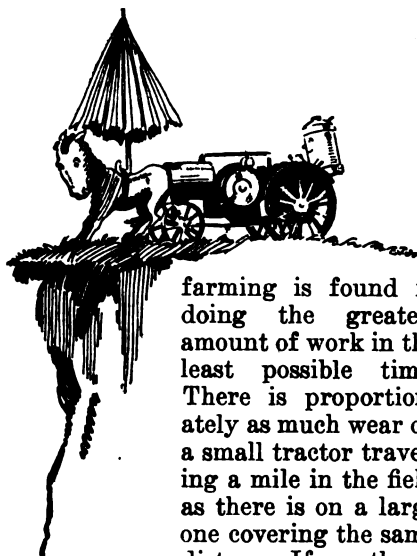
In suggesting the purchase of a tractor to a farmer the dealer should



UNDER SOME CONDITIONS IT IS BETTER TO USE THREE PLOWS THAN TWO 14 INCH.

himself know something about the draft of different kinds of tillage tools. He should remember, for example, that a so-called three-plow tractor capable of pulling three 14-inch plows 7 inches deep on a level with apparent ease may find difficulty in handling a two bottom 14-inch plow cutting at the same depth over in a neighbor's field of approximately the same soil, but hilly land. Rolling farms with slight grades—say not over 15 per cent. inclines, may justify the use of a three bottom 12-inch gang instead of a 14-inch plow in connection with, will say a good tractor conservatively rated at about 10-20 horse power. It should also be remembered that under like field and soil conditions a farmer can plow deeper with a three bottom 12-inch plow than he can with a gang cutting the same number of furrows of 14-inch each pulled by the same tractor. Many tractors are rated very close to their actual or maximum capacity, while others are very conservatively rated. The dealer who will make a little study of farm tractors, and other farming machinery, will soon be in a position to intelligently recommend to a farmer the size tractor he requires should the farmer already have his full equipment—disc harrows, clod crushers, soil packers, grain drills, harvesters, feed cutters, feed mills, etc.

As to plowing, the size of the fields, the shape of the lands, etc., should also be considered before selecting a tractor plowing outfit. A man having reasonably level soil and fields free from ditches, rocks, stumps, gumbo spots, etc., tilling upwards of twenty-five acres to a patch, would do well in purchasing a medium size tractor rather than a small one. The big economy in power



farming is found in doing the greatest amount of work in the least possible time. There is proportionately as much wear on a small tractor traveling a mile in the field as there is on a large one covering the same distance. If you, therefore can cut four furrows 14 inches wide each time you cross the field it is hastening the work considerably over a two plow outfit covering the same ground. Small fields—say eight to ten acre lots and up, with irregular boundary lines, etc., where much turning is necessary, are more easily handled with tractors of two or three plow capacity. It has been found that the most desirable or normal speed for farm tractors is from $2\frac{1}{4}$ to $2\frac{1}{2}$ miles per hour. Practically all tillage tools are designed to operate at approximately this speed and will do the best work when so used; consequently, a dealer seeking a tractor to sell to his farm friends should not get the idea that he can take great pride in telling the prospect "how fast she can go." There seems to be an impression among some dealers that farm tractors should be much more speedy than horse gaits. There is no justification for this expectation and no good reason why tractors should race down the field with a plow or other equipment, which when used at a speed far in excess of the intended rate will soon be wrecked from such misuse. Neither can the work be done as it should be if a normal or reasonable speed is not adhered to.

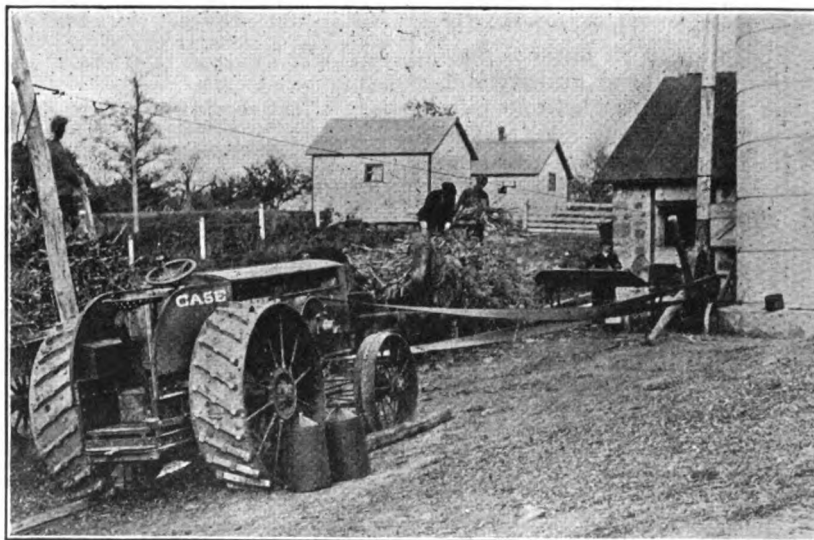
The dealer should also acquaint himself with the best manner of hitching or pulling plows or other tools. To do good work and operate on the least possible power, a plow, for example, should be so adjusted and hitched to the tractor that it will run true and level without side draft.

We believe it is not out of place here to give those who are prospective tractor dealers a little tip on the side as regards service.

The farmer, as a rule, is quite handy with machinery himself. He is not afraid to tighten up a nut, or to adjust a bearing or to pack a stuffing box for the pump, or do some other odd jobs of adjustment and repairs. He has handled machinery more or less all his life, and while he generally works in overalls does not hesitate to get a little grease on his fingers or his shirt when he believes something needs to be done to the machine to save damaging some part. The automobilist depends more or less on the garage man or dealer who sold him the car to look after the important parts, such as motor, transmission, clutch, bearings, carburetor, magneto, etc. When adjustments—grinding in valves, repairs, etc., are needed the car owner generally hires this done. Automobile dealers have made themselves very useful to car owners in this way. They are of the opinion, we believe, that the tractor

appreciates prompt action in supplying repairs or expert help when in need, he anticipates, however, that with his own ability to handle and care for a piece of machinery expert help would rarely be required. Most farmers expect expert help only in case of serious mishap or accident. Some allow, of course, for absolute carelessness or neglect on part of hired help. The average farmer feels that if he himself or his boys will operate the machine scarcely any trouble will be experienced on account of the extra care such machine will receive at their own hands. All ordinary replacements of parts broken or adjustments for taking up wear, a farmer usually attends to without calling on the dealer.

One big thing dealers can do after entering the tractor business is to impress upon every farmer buying a tractor the importance of sheltering



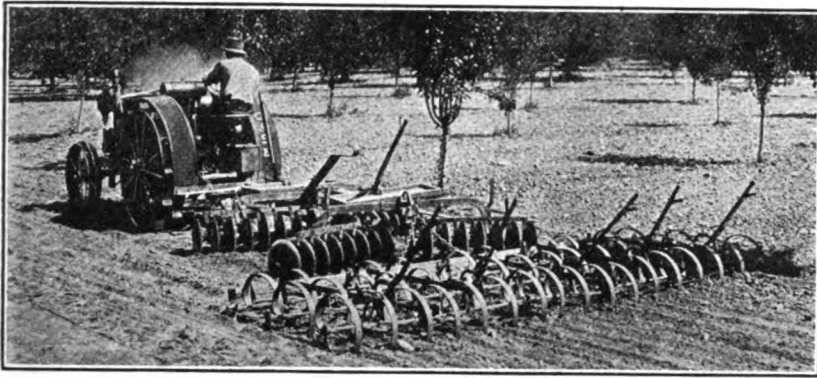
FAMILIARIZE YOURSELF WITH BELT-DRIVEN MACHINERY GENERALLY.

owner expects a similar service. Much has been written in motor publications suggesting that no one can give Mr. Farmer such genuine helpful service, if he buys a tractor, as can the automobile repairman. That is undoubtedly true.

Preaching too much on the subject of "service" for tractors to farmers, we believe, will easily scare away good prospects who are apt to conclude that if it frequently requires an automobile or motor expert to keep the tractor going, much trouble can be expected or considerable delay will be experienced, or both. The writer has had considerable experience dealing with farmers and feels that he knows quite a few of their inclinations. While a farmer

his valuable and expensive machine when not in use. If every dealer selling tractors will thoroughly impress upon each customer the saving and all-around satisfaction the owner can enjoy from housing his machinery when idle, much would be done to avoid operating delays and to prolong the life of the tractor, thereby greatly benefiting the industry.

In soliciting orders the dealer should make a practice of always using a suitable order blank, with the price, terms of payment, and description of machine carefully specified. Farmers in many sections have been in the habit of ordering farm implements, small and large, from dealers on verbal agreements. This costs many dealers collection



PRACTICALLY ALL TILLAGE TOOLS ARE DESIGNED TO OPERATE AT FROM $2\frac{1}{4}$ to $2\frac{1}{2}$ MILES PER HOUR.

expense, loss of interest on deferred payments, and other annoyances which could have been easily avoided if orders were taken in a business-like manner. While most farmers are as honest as the day is long, and consider themselves fully responsible for any obligation they see fit to take upon themselves, it has been found nevertheless that with the best of intentions buyer and seller sometime become estranged because of some actual or alleged misunderstanding about "the deal" when it comes time to pay.


Tractors are largely sold for cash on delivery but there are some good sales that dealers are making on a part cash and short time basis. A dealer who exercises good judgment in extending credit and carefully completes a note settlement with the customer at time of delivery loses little or no money on the short time orders. If possible *the dealer should aim to do business on an all cash basis.* He can generally accomplish this if he will acquaint himself quite fully with the farmer's financial circumstances and offer to help make arrangements for a loan to the farmer at a local bank, who can much more readily carry the farmer's paper than can the dealer. The dealer taking on a tractor line should become so familiar with the operation and care of all its parts that he will be in position to intelligently and systematically instruct his customer how to use and care for the machine to get the greatest amount of service out of same. Many tractors are short lived or ruined perhaps the first year because of lack of full instructions on how to care for and handle while at work and how to treat when idle. This is especially true under present-day kerosene burning tractors, many of which are absolutely reliable and will do all that is claimed for them providing they are given half a

chance at the hands of the operator.

If the salesman is not vitally interested in the work he is doing, he can not hope or ever expect to be convincing in his salesmanship.

COAL CONSUMERS MUST BUY WINTER SUPPLY NOW

Consumers must buy their Winter supply of Coal during the Spring and Summer for storage if Production is to be maintained at a maximum and the country enabled to avoid a serious Coal shortage this Winter



H. A. Garfield

U. S. FUEL ADMINISTRATION

STANDARDIZING FARM WAGONS

Manufacturers of farm wagons have agreed to standardize farm wagon specifications and not later than 1920 all farm wagons will conform to these standards.

Heretofore farm wagons have been made with a variety of tracks, the principal ones being a wide 60-inch track and a narrow 54-inch track. It has been decided to abandon both of these tracks and adopt a standard 56-inch track which is the same as the automobile track.

The next change to be made was that of the box dimensions to 38 inches outside measure. In the past the box width has generally been 42 inches.

The third important change to be made was the adoption of three standard heights of wheels of 40, 44 and 48 inches, which are to be used in combinations, enabling the use of but one standard gear. A restricted list of tire widths was also adopted graduated from 2 to 4 inches inclusive.

DRAWING TEMPER FROM BRASS

Brass is rendered hard by hammering or rolling, therefore when a brass object requires to be tempered the material must be prepared before the article is shaped. Temper may be drawn from brass by heating it to a cherry red and then simply plunging it into water, the same as though steel were to be tempered.

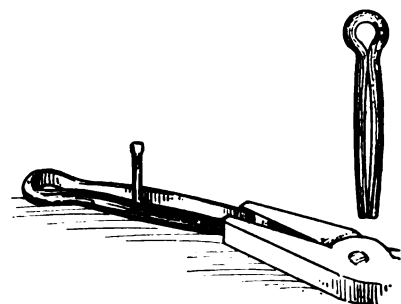
ATTENDING TO RADIUS RODS

If trouble is experienced in steering a Ford car, of course something is wrong. If, after examining the knuckles, connections and the gears in the steering post, all seem O. K., look carefully at the front axle and see if it has not been struck and forced a little under the car. The slightest "bend under" will cause the car to steer very uncertain. Many times this can be remedied by simply taking out the radius rods and turning over. Of course, if there is a bad bend it will have to be straightened. The bottom edge of the axle should tip out a little. Often that "unfindable" vibration and rattle on a Ford car can be found at the point where the rear radius rods fasten into the front end of the drive shaft housing. Unless the threads are stripped, it is a very simple matter to tighten the nuts. If the threads are stripped, the best thing is a new rod.

STRAIGHTENING COTTER PINS

How many times have you aired your vocabulary when a used cotter pin declined to go back through the hole that you took it from?

You can't hammer or spring the ends back to their original positions



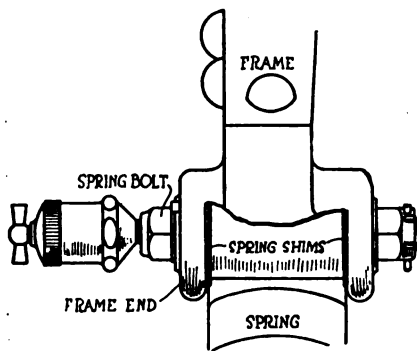
STRAIGHTENING BENT COTTER PINS.

but if you bend them over a small nail, or a piece of wire in the manner shown in the illustration no further trouble will be encountered in getting the pin to enter the pin-hole.

S. K. EDWARDS.

REMOVING PLAY FROM SPRING BRACKETS

After a car has been in service for some time there generally develops considerable wear in the spring brackets which is responsible for some play. This can easily be remedied by inserting suitable sized washers or "shims," as shown. Should the spring bolts, or, as they are commonly known in shop talk,



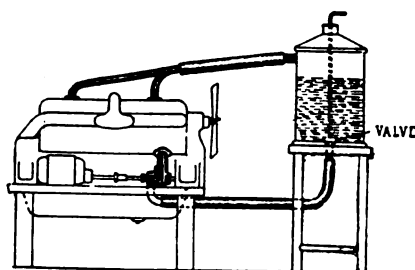
REMOVING PLAY FROM LOOSE SPRING BRACKETS

"shackle bolts" show evidences of wear they should be replaced with new ones. Looseness of parts always produces a variety of rattles and squeaks that are annoying.

In overhauling a used car the spring brackets and shackle bolts should always be gone over as they are responsible for a great many of the 57 varieties of noises present in an old car.

MOTOR COOLING TANK

After the motor has been overhauled it is often desirable to test it out on the stand. Much damage may be done, even in a short run, if some method of cooling is not provided. A five gallon can mounted on a



MOTOR COOLING TANK

wooden stand and provided with suitable hose connections offers a handy solution. Connections may be readily made or broken and the thermo-syphon cooling is sufficient for an ordinary test run.

HINTS ON MAKING PERFECT TIRE REPAIRS

Always use a sheet of waxed paper between vulcanizer and tire to prevent repair from sticking to the hot iron.

It is not necessary to cut away a lot of good rubber when mending small casing cuts. Leave everything except small shreds that cannot be incorporated in the repair. When cutting rubber, wet the knife and the work will go easier.

If a cemented or acid cured patch has covered the point of repair, it must be removed and all traces of the cement cleaned from the tube. A common spring bottom oil can filled with gasoline and an old tooth brush are handy for cleaning repairs.

When mending small casing cuts it is better to use small scraps of para than to try to cut layers to fit the hole. All air bubbles that appear when adding layers of para to fill up a cut must be punctured with an awl and pressed down flat. Don't rush the work. A few extra minutes spent in preparing a repair and vulcanizing it may save considerable trouble later.

When properly cured, a repair should not retain an indentation made by the finger nail. The longer a repair is vulcanized and the higher the temperature maintained, the harder the patch becomes. If a patch simply seems too soft, apply the vulcanizer a few minutes longer. In case it seems necessary to increase the cure, it is better to add to the time than to the temperature. Under-curing is always preferable to over curing.

If a poor patch is made it is best to remove it entirely, re-coating the hole with cement and filling with fresh para.

A porous patch is caused by damp tire, failure to let the gasoline evaporate after cleaning the tire, to let the cement dry, or by air pockets between the layers of para. It may also be caused by too high a temperature. The latter makes a patch hard and brittle.

Don't inflate inner tubes until they have cooled for a bulge is liable to be the result.

Your tire pump makes an excellent bellows for cleaning the dirt from sand pockets or casing cuts, as well as for drying the gasoline after washing the canvas. However, do not attempt to hasten the drying of cement.

It takes from fifteen to twenty minutes to vulcanize a layer of para $\frac{1}{4}$ of an inch thick if the thermometer is kept at 265 degrees and five minutes additional for each additional sixteenth of an inch. Vulcanization will occur equally well at all temperatures between 250 and 275 degrees. The lower temperatures require more and the higher temperatures less time than stated above.

CHANGE OIL

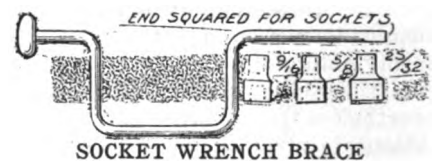
This is the season when the owner of a car should replenish oil in all compartments, engine, clutch, gear-set and rear axle. The compartments should be flushed out with kerosene before the new oil is installed.

RAISING LEVEL OF GASOLINE IN A BLOWTORCH

When the gasoline level is low in a blowtorch the pressure causes an excess of air in the burner supply pipe, blowing out the flame. In an emergency, a little water poured into the gasoline will cause the latter to float to a high enough level to operate the torch satisfactorily.

BRACE FOR SOCKET WRENCH

As handy a tool as I have around the shop is a brace wrench that I can put any of the standard sockets on. It is made of $\frac{5}{8}$ -inch iron rod which is bent like a carpenter's brace. It is squared up on one end to receive the standard sockets that you can obtain from the supply houses. The other



end has a swivel to hold it with when working. A 10 to 16-inch sweep is about right for most work. This brace with the standard $\frac{5}{8}$ -inch socket will take a Ford cylinder head cap screw out in a hurry. A $\frac{9}{16}$ -inch socket will fit the S. A. E. $\frac{3}{16}$ -inch bolts. The beauty of this tool is that you can use any size socket with it.

WM. M. MAXWELL, Michigan.

EMERY FLOUR GRINDING

The most convenient method of handling emery or other cutting powder is in combination with ordinary non-fluid engine grease. Make a mixture by adding a small percentage of emery to the grease and stirring thoroughly. Care must be taken not to add enough powder to destroy the sticking properties of the grease. This when applied will not fly off as oil will. The mixture will also cut faster than emery and oil.

OIL FOR SMALL PARTS

The brake mechanism seldom gets the lubrication it deserves. Oil is required on the pins supporting the brake shoes and upon the bearing points of the cams or toggle mechanism, which actuates the brakes. These parts usually depend for lubrication on the hand oil can. Beginning at the operating lever, every joint in the brake rod needs occasional oiling, so do the bearings of the compensating shaft.

The Motor Car Paint Shop---VII.



Any system of painting and finishing the chassis demands, first of all, a thorough cleaning of the parts, which cleaning may be accomplished, as surface conditions suggest, by first scraping the grease and dirt accumulation, if any, from the surface, following by rubbing with strips of burlap or other coarse fabric soaked in turpentine.

Having the chassis properly cleaned and later dressed over with sandpaper, proceed to bring the surface up by the employment of whatever method or system is used upon the body.

Celox Rapid System

In case of the celox rapid method, use the celox metal primer upon both the metal and wood portions, brushing the primer out thoroughly and uniformly. After twelve hours, brush on a coat of celox knifing-surfacer (sanding-surfacer) using it on the exposed parts in a semipaste form which at the right stage of drying may be drawn out under a heavy piece of harness-leather to a glasslike smoothness. The prime requisite in this operation upon either metal or wood, is an application of bodying and filling-up pigment so smooth as to require but very little sandpapering.

Any necessary puttying should be done upon this coat of surfacer in a fashion to require but little sandpapering, which may be done after twelve hours ready for the following coat of groundwork.

Subsequent process leading up to the finish may approximate in time, method, and material, the process applied to the body of the automobile.

"VVV" System for Medium-Quick Work

With the "VVV" system being applied to the body, use "V" priming upon the chassis, following the thorough cleaning already mentioned, and after forty-eight hours apply with a brush a coat of "VVV" surfacer special, using it in the same way advised for the rapid method of chassis painting. For an extra-fine surface, use a second application of the "VVV" surfacer special, beating the second coat material rather thin in turpentine and applying with a camel's-hair brush. Sandpaper this coat gently after thirty-

six hours with No. 00 sandpaper and apply coat of color groundwork.

Then observe to the finish the regular practice of the "VVV" system prescribed for the body.

The P. W. F. System for Bringing Up Bodies of Either Wood or Metal

First Day—Clean the surface carefully of all dirt or grease. In the case of metal bodies the surface should then be scoured with No. 1 sandpaper.

With a common round bristle brush apply a coat of permanent wood filling. The workman then proceeds to wipe off with rags or scrap-burlap every trace of superfluous filler, taking care to wipe out the corners of moldings, etc., until finally the hand may be passed over any portion of the surface without being soiled.

This operation serves at the same time to rub the filler into the grain or pores of the surface in a most thorough manner.

Allow forty-eight hours for drying.

Third Day, P. M.—Apply a coat of ground roughstuff, thinned with pure turpentine to a creamy consistency and having about 5 per cent. of raw linseed oil added to the material thus prepared.

Allow forty-eight hours for drying.

Fourth Day—Putty up.

Fifth Day—Apply the second coat of ground roughstuff. This should be thinned with pure turpentine only.

Allow twenty-four hours for drying.

Sixth Day—Apply the third coat of ground roughstuff, thinned with pure turpentine only.

Allow twenty-four hours for drying.

Seventh Day—Applying the fourth coat of ground roughstuff, thinned with pure turpentine only.

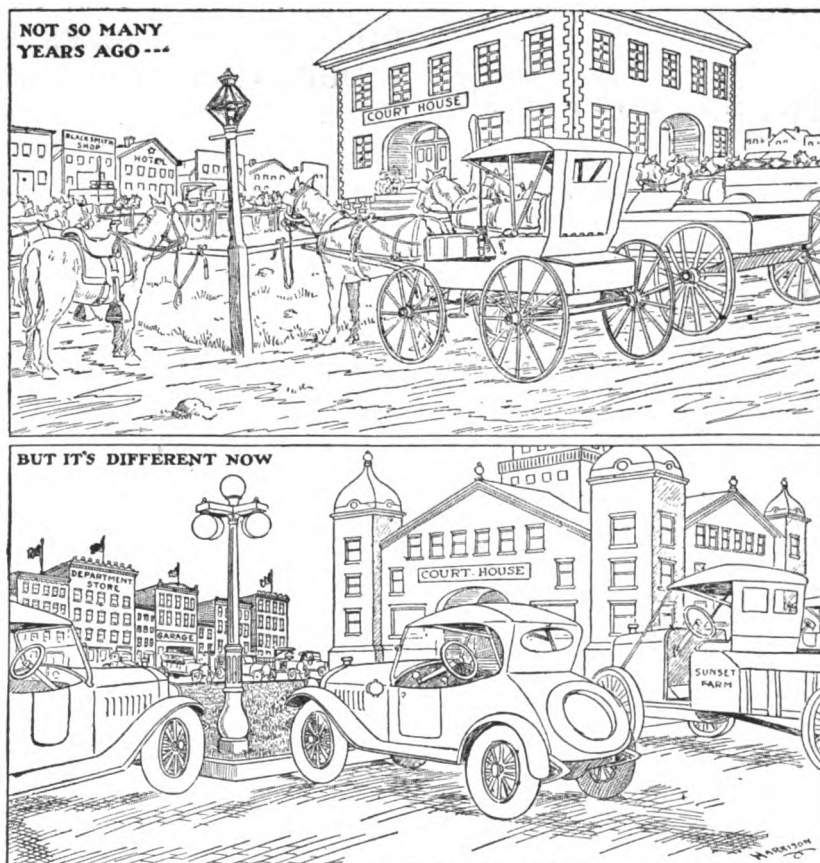
Allow twenty-four hours to dry.

Eighth Day—Apply guide-coat and rub with pumice-stone.

Ninth Day—With clean cloths rub permanent wood filling over the roughstuff, being sure to wipe off thoroughly as per instructions for the first day.

Allow forty-eight hours for drying.

Eleventh Day—Apply the groundwork or a coat of flat color.



WISCONSIN FARMER

Allow twenty-four hours for drying.

Twelfth Day—Apply a second coat of flat color.

Allow twenty-four hours for drying.

Thirteenth Day — First coat of vanadium color varnish or black japan.

Allow forty-eight hours for drying.

Fifteenth Day — Second coat of vanadium color varnish or black japan.

Allow forty-eight hours for drying.

Seventeenth Day—Lay on a coat of clear quick leveling or vanadium elastic rubbing varnish, or a third coat of black japan.

Allow forty-eight hours for the quick leveling or seventy-two hours for the elastic rubbing to dry.

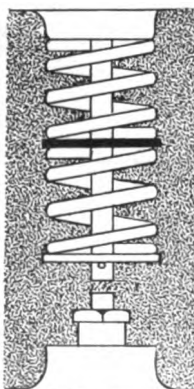
Nineteenth Day—Rub the surface carefully with pumice-stone flour, wash well with clear water and wipe wearing-body or vanadium body dry with a clean chamois skin. Stripe and letter if necessary and let the job stand over night to dry thoroughly.

Twentieth Day—Apply a coat of varnish. If an even more durable job is desired give the finishing-varnish one week to "harden," rub lightly, and apply a second coat of the same varnish immediately so that the rubbed surface will have no time to sweat. (*To be Continued.*)

VALVE SPRING REPAIR

Few motorists carry an extra valve spring in case one breaks and few repairmen have a suitable spring on hand to replace a broken spring.

The breaking of valve springs is by no means uncommon and when it does one of the cylinders is out of commission and reducing the engine power.



AN IRON WASHER APPLIED AS SHOWN TAKES ALL THE STING OUT OF A BROKEN VALVE SPRING WHEN ANOTHER SPRING IS NOT TO BE HAD.

Remove the lower half of the broken spring and slip an iron washer over the valve stem, replace the broken part and as the washer prevents the broken parts from slipping together, this repair will answer almost as well as a new spring.

SUCCESSOR TO THE STREET CAR



OPERATED BY THE CITY OF SAN FRANCISCO. HAS SEATING CAPACITY FOR 18 BESIDES STRAPHANGERS.

AN ELECTRIC STEP LIGHT MAKES WATCHING YOUR STEP EASY EVEN IN THE DARK. THE DOOR IS OPERATED BY A CRANK HANDY TO THE MOTORMAN-CONDUCTOR-CHAUFFEUR.

TIRE AND RIM SIZES REDUCED FROM 200 TO 28

At the request of the economy board of the Council of National Defense the tire manufacturers of the country have adopted the board's suggestions for simplifying and standardizing pneumatic automobile tires and rim sizes.

The adoption of the following schedule will reduce the number of sizes and styles manufactured and carried in stock by both tire manufacturers and their customers, from approximately 200 to 28. The schedule of pneumatic tire and rim sizes adopted as standard, follows:

Clincher, 30x3½, plain and non-skid. Applied to 30x3½-inch rim.

Clincher, 31x4, plain and non-skid. Applied to 30x3½-inch rim.

Straight-side, 32x3½, plain and non-skid. Applied to 32x3½-inch rim.

Straight-side, 33x4, plain and non-skid. Applied to 33x4-inch rim.

Straight-side, 34x4½, plain and non-skid. Applied to 34x4½-inch rim.

Straight-side, 35x5, plain and non-

skid. Applied to 34x4½-inch rim.

Straight-side, 36x6, plain and non-skid. Applied to 36x6-inch rim.

Straight-side, 38x7, plain and non-skid. Applied to 38x7-inch rim.

Straight-side, 40x8, plain and non-skid. Applied to 40x8-inch rim.

This simplified and standardized schedule will ultimately result in the use of seven sizes of rims and nine sizes of tires, adequate to equip with pneumatic tires any motor vehicle up to a two-ton truck.

Especially attention is called to the new rim size introduced, viz., 33x4, it being a compromise between 32x4 and 34x4-inch sizes. It also requests the earnest support of automobile manufacturers in the program looking to the standardization of American inch sizes on all export shipments of cars, which will eliminate the necessity for manufacturing and carrying in stock, both in this country and in foreign branches, 43 sizes and styles of millimeter clincher tires.

It is evident that so long as tire manufacturers are called upon to manufacture and carry in stock in

These "Remarks" Agree with Your Views on The Subject; Do They Not?

No better epitaph than the following could be inscribed on any man's tomb, "Here lies an honest man".

The note of a man who is known to be honest is better collateral at the banks than the note of a man worth ten times as much who is known to be a crook.

Men there are, who are really the "salt of the earth", and yet were never out of debt. But, if they can't pay when due, they make satisfactory arrangements in lieu of payment.

If a merchant loses his credit, he is ruined as a business man. That's why he tries so hard to collect what is due him.

There are men walking the streets and roads today doing odd jobs for a livelihood, that could have a home and comfortable surroundings if they could collect what is honestly and justly due them.

A great many merchants all over the country are adopting the cash system for the sole reason that collections are so slow.

You may be tried by fire, water, panics, droughts, sickness and death, but your credit, if it is good, will carry you safely over every obstacle.

Why is it more essential that you pay your taxes than your other bills? The State is more able to lease or to wait, than we are.

We know you're not going to leave the country, we know you're honest, we really appreciate your trade, but we need the money to invest again so that we may accommodate both you and your neighbor once more.

So please either call and settle, or send check or money order, and oblige.

Very truly yours,
Correll.

THE FORM OF ENCLOSURE ABOVE IS SENT OUT FROM TIME TO TIME TO SOME OF MR. CORRELL'S SLOW PAY," AND IT BRINGS 'EM IN EITHER TO APOLOGIZE OR SETTLE.

their plants and thousands of branch stores, approximately 200 sizes and types of inch size tires and 43 sizes and types of millimeter tires, the result will be inefficiency in manufacture, excessive manufacturing costs, needless use of high cost storage space, and inability to make that prompt delivery to manufacturers and car owners that would follow the adoption of the simplified standard schedule outlined above.

REPAIRING CUTS AND TEARS

It has been found difficult to repair cuts and tears on the side walls of tires (caused by ruts and rocks) with the common small vulcanizer, especially when the injury is close to head of tire, on account of the rim preventing vulcanizer from fitting closely to side wall of tire. However, if a small sack (five or ten-cent salt sack does very nicely) filled with sand and tied tightly is slipped inside the casing (casing need not be entirely removed from rim—one side is all that needs to be slipped off) and vulcanizer applied in usual way, it will be found that the resulting patch will be as smooth and firm as could be desired.

HINT FOR SAVING GASOLINE

Here is a gasoline saver: Remove manifold pipe, secure a small piece of sieve wire, copper or brass preferably, moderately fine mesh. Fit piece just inside of manifold pipe where it attaches to carburetor, and solder in place. Then replace manifold and job is complete. This attachment breaks up and equalizes the vapor and delivers a more perfect mixture to the cylinders; it also makes starting easier and gives additional power and greater mileage.

VALVE LIFTER—

The hardest thing about grinding valves is to remove the pin from the valve stem that holds the valve spring in place and while this pin can be removed without a special valve lifting tool such a tool simplifies the job considerably and lessens the risk of bruised fingers.

The lifter illustrated can be made to any desired dimensions and the fact that it is adjustable makes it particularly desirable. The part that forms the handle is made of a piece of 3/16 flat stock, 1 1/4-inch wide and 12 1/2 inches long. An inch and a half from the end a 1/2-inch hole is drilled and the 1/2-inch slot is cut out with a hack saw. About 4 inches from the end drill a 3/16-inch hole, then with the slotted end in the vise give the stock a quarter turn so the forked end will be at right angles with the other part, the point should be sharpened like the tang of a file and a handle provided as shown.

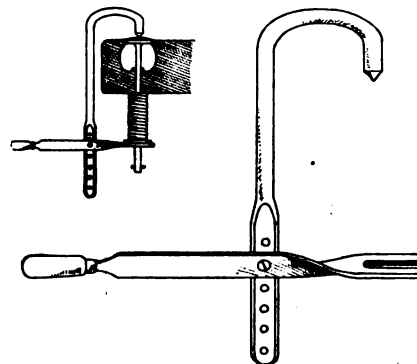
The remaining part is made of a 3/8 rod about 17 or 18 inches in length. File one end to a point and place in the jaws of the vise giving it a sharp bend. The part in the vise should be about 3 or 4 inches long. Flatten the other end of the rod out for a short distance and drill six or seven 3/16-inch holes about 1/2-inch apart. Holes can also be drilled into the handle that forms the lever so as to make the finished tool adjustable in two directions—vertical and horizontal.

NOT MADE IN GERMANY

At various times in the future you will probably buy some article on which you will perhaps find a sticker, plate, etc., bearing the inscription:

Nothing German embodied in the manufacture of this article.

Manufacturers, acting independently and outside of any organization having as its object the boycotting of German goods are using this announcement which we must say sounds better than "Made in Germany."



AN EASILY MADE AND SIMPLE ADJUSTABLE VALVE SPRING LIFTER.

ASSEMBLING UNIVERSAL

A method which will help in disassembling and assembling universal joints on Ford cars is to loosen the shackle nuts on the rear springs (both sides) to within a few threads of the end of the bolts. Then, by placing a bar between the spring and rear axle, the axle can be pried back about one-half inch. This same kink will also be found useful in removing and replacing transmission covers, especially on Ford cars which fit tight.

TIGHT SPRING CLIPS

It is a good plan occasionally to see that the nuts of the spring clips are tight. Loose spring clips permit excess stress to be thrown on the center of the leaves, from which breakage results.

GANDY GARAGE

A. C. KIRBY & SON

Oakland
Sensible Six

Goodyear Tires
and Tubes . . .

THE MESSRS. KIRBY ARE DISCRIMINATING MEN—THEY SELL OAKLAND CARS AND READ THE AUTO & TRACTOR SHOP.

PRINTED STATIONERY

What would you think of any of the firms you do business with if they wrote their letters to you on paper that didn't have their firm name and address printed on it? You would think they were a pretty cheap "outfit"—naturally.

Again—what do you suppose the jobber or the wholesale dealer thinks when he receives a letter written on plain paper? This is about what he thinks "this guy is certainly some small potatoes, he don't even say what kind of business he is in and as far as we know we don't know whether he's in business at all."

Therefore, it is to the interest of all concerned to use printed letterheads that tell something about you and your business. Many firms and supply houses do not sell to any one but those in the trade and if they receive a communication written on plain paper asking for their discounts and terms to dealers they are apt to think that you are not a dealer and not entitled to this information.

Printed stationery gives you a certain amount of standing with people receiving your letters and are an indication of progressive business methods of the man writing and receive additional and more favorable attention than if the letter had been written on a piece of plain paper that might have brought home the writer's last piece of liver from the butcher.

The cost of printed matter of this sort is small and the results are worth while. We show here a number of examples of printed stationery that are used by our subscribers.

When you have your printing done obtain a quantity of the same paper without the printing for use as "second" sheets and use only the printed sheet for the first sheet. In this way your supply of printed letterheads will last longer and besides no one uses more than one printed letter head in writing a letter, the other sheets being plain and without any printing.

O. W. ANDERSON, Manager

O. B. SEYMOUR, Secretary-Treasurer

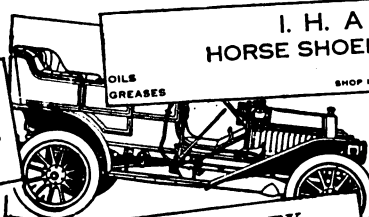
O. F. ABEL

TORKILDSON BROS.
General and Blacksmithing

J. W. MCKEE

PRACTICAL CARRIAGE MAKER
REPAIRING OF ALL KINDS. BUGGIES, WAGONS & AUTOMOBILES.

FRED ABEL

THE ABEL GARAGE
AUTO REPAIRING, AUTO SUPPLIES, PRESERVATIONAgents for High-grade,
Automobile, Gas
Engines and
Accessories.ALICE HOLCOMB & SONS
GARAGE AND REPAIR SHOP
FORD PARTS AND ACCESSORIES
TRACTORS AND TRAC-FORDSTHE PARK GARAGE
GEO. L. HENDRICKSON, ProprietorThe Valley City Welding and Manufacturing Co.
Rock Port Garage and Machine Co.Manufacturers of
Automobile Springs of All Patterns. General
Blacksmithing and Drop Forging.
Autogenous Welding and
Bracing Plant.Reboring and Regrinding of
Auto and Tractor Cylinders,
regardless of size.
Automobile Axles and other
shafts made to order. Van
adium and Nickel Steel used
in Patents.OXY-Acetylene Welding of
Cracked Cylinders, broken
Cast Iron and Aluminum
Crank Cases, Gears and Cast
ings of all descriptions.RANEY'S MODERN SHOP
OXY-ACETYLENE WELDING
FARM & SON, Inc.
GENERAL BLACKSMITHING
AUTO AND MACHINE REPAIRING
GOOD WORKWILLIAM N. BENOIT
AUTOMOBILE REPAIRER
LATE FREDERICK BILSON GARAGE, DETROIT, MICH.REPAIRING IN ALL
THE BRANCHES
H. J. COLE
GENERAL BLACKSMITHING
AND WOODWORKJ. M. HUGHES
OFFICE OF—
AUTOMOBILE TIRES AND ACCESSORIESH. A. SCHNEIDER
PRACTICAL HORSE
WAGON AND CARPENTER
1001 M STREET
To Anderson & Christensen
Automobile Repairing
a SpecialtyWETMORE & SON
BLACKSMITHS
AUTO AND ENGINE MECHANICS
CALIFORNIASTEVEN BARTEK
Truck and Wagon Builder
AUTOMOBILE BODY BUILDING
AND BLACKSMITHING
25 PRINCE STREETHarold Halvorson
Smithing, Horse Shoeing, Automobile RepairT. W. KITTO
General Blacksmithing and RepairingHartford Tires and
Auto RepairsI. H. ANDERSON
HORSE SHOEING & BLACKSMITHING

SHOP IN MORRISVILLE ADDITION

J. V. GOODACRE
Blacksmithing and Wood WorkingAUTOMOBILE SUPPLIES
GENERAL REPAIR WORKTORKILDSON BROS.
GENERAL BLACKSMITHING, AUTOMOBILE REPAIRING AND
ALL KINDS OF WOOD WORKFRED E. DETWYLER
Blacksmithing, Carriage, Wagon and Automobile RepairingA. L. GORDON
General Blacksmith and Machinist
Automobile Repairs
Phone Main 43
1001 M StreetRYAN & LUTZ
Builders of Wagons and Automobile Bodies
Repairing and Painting in all its Branches
Dealers in New and Second Hand Wagons and AutomobilesJ. A. BELMONT
WAGONS AND CARRIAGE
114 South Maple Street
Telephone 124F. W. SCHROEDER
WAGONS AND CARRIAGE
114 South Maple Street
Telephone 124BARRERE & HUGUE
VEHICLES OF ALL KINDS
AUTO BODIES BUILT AND FINISHED REPAIRED
Reboring and Grinding of Cylinders, Crank Cases, Gears and Castings of all descriptions.U. G. NEALE
REPAIRING
AUTOMOBILE WORK

THE ARMY HORSESHOER

The chalk will be rubbed off from the extet point of contact with the opposite leg.

Inspect the shoeing for projecting clinches or ragged edges of the hoof, due to neglect. If the shoeing is of recent date, note if the shoe is too full. Then inspect the foot and see if the inside is too low or the outside is too high (broken in). This fault bends the leg inward at the fetlock joint, starts the foot on a curve instead of a straight path, and thus lessens the clearance space between the legs.

REMEDIES—If the fault is in the shoeing, or in the preparation of the foot, the remedy in either case is apparent. If the horse continues to interfere after the bearing surface has been leveled and the foot properly shod, different careful experiments must be made, because tests show that there is no fixed rule. A shoe that will be of benefit in one case may be just the reverse in another.

In general, prepare and shoe the foot in such a way that the breaking over will be at the center of the toe. As much, if not more, is accomplished by skillful preparation of the feet than by the use of extraordinary shoes.

If the foot breaks over on the inside of the toe an angular extension (about $\frac{1}{8}$ inch; see Pl. XIV) on the inside toe will be beneficial. When the shoe is in place, the part projecting beyond the wall should not exceed that outside the white line on shoe in plate. The extension is made by thinning and widening the web of the shoe at the desired point. Fit the shoe close on outside from center of toe to quarter, and roll outside toe with the rasp, full on the inside from toe to second nail hole, and close from there back, sharp edges on the inside being hot rasped to avoid cutting.

Ordinarily the lightest part of the foot, especially of the front foot, is lifted first. For this reason a side weight (Pl. XIII, fig. 3) on the inside of the fore foot will often aid in correcting interfering. As previously stated, this will not always produce the desired result. On account of differences in pastern action, the result may even be obtained by just the opposite—the weight on the outside.

The foot may be prepared with the inside high (broken out) in order to cause the foot to break over

outside the toe and to increase the clearance space.

A small side calk may be placed on the inside of the inner half of the shoe immediately under the part of the hoof that strikes. The calk should conform to the curve of the shoe. The heel of the shoe should be thickened to correspond to the height of the calk.

It must be understood that improper preparation of the foot and the use of a side calk are extreme measures. They throw the foot into an unnatural and strained position, and therefore should not be used unless this discomfort is to be preferred to severe cutting of the legs. As the fault of interfering disappears a return to normal conditions must be accomplished.

If the hind feet strike, the bearing surfaces should be leveled or corrected as in the case of the front feet. A side weight on the outside of the shoe swings the foot outward sufficiently to correct the defect in ordinary cases.

THE ROLLER-MOTION SHOE.

—The full roller-motion shoe can be made from heavy bar steel only, and as this is usually not obtainable at Army posts the shoe is seldom used. It is made in the same manner as the plate shoe and the ground surface is then rounded with the hammer from the last nail hole on one side to the last nail hole on the other; the outside edge is made very thin and the inside edge is left unchanged. The shoe is then finished with the rasp.

The service shoe, on account of the crease, can be rounded only at the toe. The rounded toe, however, will

generally be found to accomplish the result desired.

THE FRONT FORGING SHOE.

—The heel calks of this shoe are turned as explained for the calked shoe (par. 55) and then bent well forward. Hold the shoe on the face of the anvil, the tongs grasping it at the toe, the ground surface up. Strike directly on the calk, bringing the hammer toward the toe. After bending the calk forward, be careful to level its ground surface so that it will rest evenly when the shoe is placed on a flat surface.

The toe is rolled as explained for the roller-motion shoe.

THE HIND FORGING SHOE.

—This shoe is fitted in the same manner as the normal shoe, with the following exceptions: The toe is squared and the heels are cut off so as to be longer than in the normal shoe; the toe clip is omitted and two side clips are drawn.

THE TOE WEIGHT.—This shoe is made from the issue front shoe. Heat the shoe to a white heat and with the hammer and a cold chisel cut a line on each half of the ground surface of the shoe halfway between the crease and the inside edge. Begin the work of cutting, however, near the toe; never at the heels. The cut should begin obliquely because a right angled cut weakens the shoe at this place and causes it to break after much wear.

Reheat and cut until the part inside of the lines is entirely removed. The rough edges are finished with the rasp, and the shoe is fitted in the same manner as a normal shoe.

WAR SAVINGS STAMPS DELIVERED TO YOUR HOME

Tear Out—Fill In—Hand Letter—Carrier—or Mail to Post Office

TO THE LOCAL POSTMASTER:—Kindly have letter-carrier deliver

to me on _____ for which I will pay on delivery:

_____ \$5. U. S. WAR-SAVINGS STAMPS at \$_____ each

(State number wanted)

(See prices below)

_____ 25c. U. S. THRIFT STAMPS at 25c. each.

(State number wanted)

Name _____

Address _____



W. S. S. COST DURING 1918					
April	\$4.15	July	\$4.18	Oct.	\$4.21
May	4.16	Aug.	4.19	Nov.	4.22
June	4.17	Sept.	4.20	Dec.	4.23
W. S. S. WORTH \$5.00 JANUARY 1, 1923					

Queries-Answers-Notes



THIS department is the meeting place where you are free to ask for information, answer questions, discuss shop matters and business conditions and any other notes you feel would be of interest to a fellow mechanic. Make use of this Department as often as desired.

Mr. Maloon Draws Fire—In the March number I noticed the letter of E. H. Maloon, describing his experience in shoeing a foot with a dropped sole. As this is rather an interesting subject to me I hope we will not take offense if I pass a few remarks on the subject as it may be of service to somebody. It appears to me that some time previous to this horse's visit to Mr. Maloon's forge it had suffered from inflammation in the feet causing separation of the horny laminae from the sensitive laminae of the pedal bone, causing a fungous growth at the toe which presses the pedal bone downwards and which is commonly called the dropped sole. The cutting and paring out of the sole of any horse's feet is considered bad practice in this country (England) and should not be encouraged as the horny sole protects the sensitive sole underneath and by its natural process of exfoliation is quite capable of taking care of itself the more horn taken from the sole the weaker it becomes and is much more liable to injury. As all horse's ailments are practically alike in every country it seems to me that in dealing with feet in this condition in your country the wrong principle of shoeing is applied, as in nearly every case that I have seen described of this sort the secret of success lay in the height or position of the heel or toe calking, according to the skill of the farrier.

Now in this country of England none but the most antique of farriers would think of using calks in such cases. The ideal shoe advocated here by the vets. and the leading lights in the art of farriery is the rocker shoe. The toe and heel thinned down to about half the thickness of the quarters or the point of balance and used either with or without the bar at the heels. Keep the nails well back from the toe (the seat of the pain.) In all these cases it will be noticed that the horse tried to get his heels down first—well, why not help him to do so? A foot with a dropped sole can never be cured and it is no use to prop such feet up with calks etc., to the correct angle if it is in pain and misery all the time. The right thing to do is to apply your shoe so that the horse can walk comfortably and thereby adding to his usefulness. If a farrier had a bunion under his toes would he build up his heel to ease it, no, he would be more likely to take some of it off so as to throw the least possible pressure on the toe, moreover he can throw his boot off at night, but the poor horse has to keep his on till it is worn out in most cases and is entirely at the mercy and intelligence of the farrier.

T. Northwood, England.

"On account of the War"—I did not renew my subscription sooner than I have

because I was thinking about quitting the business. I can't get help. We blacksmiths are like the farmers in that respect. I am located in the Ohio mining district where they pay blacksmiths \$6.50 for an eight hour day and I can't afford to pay wages like that and I know of no other repair or shoeing shop that can. Some may say they can but they can't, especially when they have cheap competitors. We blacksmiths made a raise in our prices but it is so small that it is not worth mentioning the way the cost of materials has been increasing. Three shops here have gone out of business, saying they would rather quit than raise their prices and there would be more of them quit if they could not work six days a week. It is a good thing the weather can't stop them from work or there would be more shops for sale.

I do horseshoeing and light repairing



MR. ARTHUR A. BURNAP'S ESTABLISHMENT IN NEW HAMPSHIRE, THE BLACKSMITH, AUTO REPAIR SHOP, PAINT SHOP AND OFFICE ARE ON THE LEFT. THE BUILDING WITH THE GLORIFIED BARBER SHOP EFFECT AT THE RIGHT IS HIS WAREHOUSE.

and I have more work than my helper and myself can do the year around. Some of my customers ask me to repair their cars and I tell them that I don't want to have too many irons in the fire at one time. I don't have time to fix my own car. A man can't shoe horses and repair cars when he can't get help. All customers come in a hurry and these garages are run by boys but you can't find a blacksmith shop run by help having only 24 hours experience but somehow us blacksmiths don't seem to be able to charge as much as the garages. I am glad they know how to charge.—A Reader.

Suggest that our reader get into the auto repair business. He will make more money and he won't have the difficulty that he has in securing help. It takes a lifetime to make a good horseshoer and all around blacksmith but along comes some boy with 24 hours training, so to speak, opens up an automobile repair shop and makes good as well as makes money, while the blacksmith, better fitted to do

the work in every respect, is satisfied to take the "odd jobs" and sends the profitable jobs to the auto repair shop.—

Editor.

Blacksmiths. "Over. There". are. up against it too.—"With the ever increasing use of motor vehicles, the picturesque forge is fast disappearing from towns and villages in the old country."

John Y. Dunlop, Scotland.

What the Jobber Thinks—"The horse shoeing business has come to a point now where it cannot possibly support the number of men in this business and they are therefore, taking up the repair business which they are in many ways more qualified to do than the garage men.

"A good blacksmith is a mechanic by instinct and is an expert in making the small parts that are oftentimes necessary. Further than that the blacksmith business is a much more stable one than the garage business and we find a smaller percentage of dishonest parties in this line than we do in the newer garage business."

After supper chat—Seventeen years ago I received a sample copy of Volume 1 and was so well pleased with it that I subscribed for it and from that time to date I have received every copy and have been well pleased with all of them.

I have been trying to learn how to run a general repair shop for over 50 years and have found that it pays to get the best literature obtainable and study it, for life is too short for one man to work out all the problems that are presented. I have

failed to find anything better than your magazine. I believe the money I invested in it has paid me the highest dividends of any money I ever spent—let me prove it.

Some time ago the editor of a paper came into my shop and said that he "was up against it" with a job of printing that he could make a fine piece of money on if he only had a chase big enough but the job wouldn't wait until he could obtain a larger chase from the makers.

"Can you make it this afternoon so I can get it this evening and what will it cost?" I told him that it would cost just what the chase would cost him laid down at his office from the factory and that he could get it that same evening.

In an hour and a half from the time we took the steel from the rough the chase was finished. That evening the editor came in with his catalog and paid me the list price \$18.75. My total cost for material, labor etc., was \$1.10, having made a profit of \$17.65 and this was made pos-

sible for me by the diagrams and instructions in the American Blacksmith nine or ten years ago.

A friend of mine, a blacksmith by trade was working as a railroad coppersmith. They had an engine break the frame. The road's smith welded this break three times but it never made a round trip but always broke at the weld. (He had learned his trade and didn't need the American Blacksmith) My friend said he could weld it and this was reported to the general foreman.

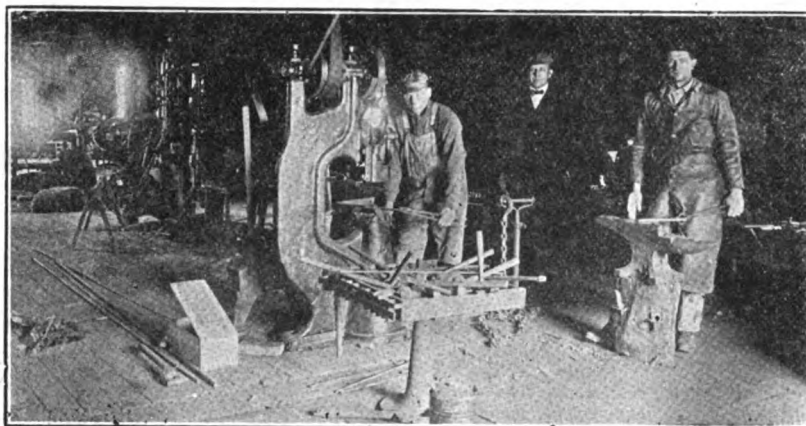
The foreman turned the job over to the coppersmith and told him that if he could make it hold that he was a blacksmith instead of a coppersmith. My friend welded that frame and welded it right and was immediately put on as a blacksmith at double the pay he had been receiving as a coppersmith, thanks to the American Blacksmith for diagrams and explanations for this particular job.

I could go on writing of one instance after another that would fill a complete issue of our magazine. This was not what put the writing microbe into my system and the only remedy that I have found to relieve it is to get pen and paper and run him out with ink.

There was a man started on a trip to Jerusalem and some thugs spotted him and after tapping him on the bean and not finding enough money on him for their trouble they stripped him of his clothing. Directly a couple of his neighbors came along and took a slant at him and as he didn't seem to have anything else worth taking they gave him the ha, ha, and kept on tracking. Presently a man came by who was a stranger to that neighborhood and opined that if the robbers' victim stayed where he was he was likely to get a badly sunburned hide and anyhow if the sun didn't get him that the flies bit like thunder. He wrapped his cloak about the man and placing him on his ass took him to the nearest inn where he could be taken care of. This is somewhat different from the original story of the man who fell among thieves but it always appeared to me that the last man who came along was a real decent guy.

I believe that if a man is working at a job that is dangerous and he found a way to mitigate a part of the danger and didn't make it known to all the people on the job as far as possible, does not measure up to the same class as the last guy.

We that work with oxy-acetylene welding plants must take some risk. It is unavoidable for when anything as elastic as oxygen is compressed into a cylinder to 1,800 pounds pressure and if the cylinder should let go it would make a big noise and be very likely to hurt some one. Then we should handle the acetylene as carefully as possible. I expect that nearly everyone when they have coupled up a fresh tank does as I have done in the past and that is to stand in front of the gauge to see if it is a fully charged tank and turn on the oxygen. I don't do that now (let me repeat) I don't do that now. When I open the oxygen I stand to the side of the gauge, neither in front nor behind it and take hold of the valve and turn my back to the tank and then open the valve, and wait for two or three seconds before going to the welding table. It makes no difference whether the cylinder is nearly exhausted or not I will not open the valve in any other position. We are creatures of



THE POWER HAMMER IS HERE SHOWN EARNING ITS WAY IN THE KANSAS SHOP OF W. C. ZIMMERMAN. NOTICE ALSO THE GENERAL WELL EQUIPPED APPEARANCE.

habit and I believe a good habit is valuable all the time.

There was a 17 year old lad working with a welding plant in this town (he isn't now.) He coupled on a fresh oxygen tank and the diaphragm in the high pressure gauge exploded and literally cut his face into ribbons from his mouth up and destroyed both eyes. He saw that he had 1,800 pounds pressure—that was the last thing he saw or ever will see. Now let me say in capital letters. Don't Stand in Front of the high pressure gauge when opening the valve—it is not safe. Glass eyes may look alright to the people who can see but they are not good to see with for the fellow that has to wear them.

E. E. Mercer, Kansas.

Finished Tools—In February Number I noticed that John A. Ziegler, Sr., Iowa, inquired how to put fine finish on tools and as there has been no detailed method given I will endeavor to give him the desired information.

Tools to be nicely polished are first ground on an Emery Wheel or Grind Stone; then polished on a wheel constructed of wood with a piece of leather belting the width of the face, and just long enough to lap around it, and fastened on the face of the wheel with wooden pegs and glue.

It is well to have two of these wheels with about 60 grade ground emery on one and 80 on the other, so as to cut the scratches out of the tool on the 60 grade wheel which are made while grinding on the emery wheel, then give a finer finish on the polishing wheel which has the 80 grade emery.

To coat the polishing wheel with emery, prepare a narrow and long box that the face of the wheel will fit in easily, put the ground emery in it: have some glue melted or prepared, and coat the leather face of the wheel using a brush to paint the glue on the leather; put a piece of wood or iron thru the hole of the wheel, and role the leather face in the box of ground emery until it is covered; then hang it up to dry, and as often as it wears off repeat the operation.

After the fine wheel has been used on an article then it may be given the finished polish answered by Michael Byrnes, in the last February Number.

W. H. Mitchell, Indiana.

From New Hampshire—Elsewhere in this department will be seen a picture of the establishment of Arthur A. Burnap, of New Hampshire, which consists of a blacksmith shop, ox-sling room, office, paint shop and store house.

These buillings have been in use for about 30 years. Mr. Burnap speaking in his letter of the changes that have taken place says; "in the old days I used to keep four blacksmiths at work all the time, but since automobiles have become so numerous I have given up wagon building but still do repairing and painting.

"Now most of my competitors in surrounding towns have gone to work for Uncle Sam so I am trying to do my bit at home by helping the farmers keep their farm machinery in shape and their horses feet in good condition so they can do their best to help out in the present food crisis."

Razors from Horseshoes—An interesting feature of Chinese industry is the making of knives and razors from old horseshoes. The local blacksmiths in the interior cities and town supply the great population of the empire with knives, razors, and scissors of an inferior quality at a very small cost. This cutlery comes from small shops, where only one or two men are employed, usually the proprietor and his sons, and is chiefly made from old horseshoes, imported from England and the Continent. A discarded steel shoe offers the best material for blades, but the blacksmiths prefer the old shoes of soft iron that come from Glasgow and Hamburg.

One British firm at Tientsin brought over a cargo of old horseshoes from Australia recently, but could not dispose of them, as the native smiths said that the iron was too hard. They like the soft iron, because it can be more easily worked by their primitive methods.

A razor used by the poorer class, having a cutting edge of less than two inches, costs twenty t'ung-tzus, about nine cents in American currency. Upon the strop the blade takes a fair cutting edge, but is too soft to hold it. Any number of stroppings are necessary before the act of shaving can be completed. After the blades are forged they are simply case-hardened, and not subjected to the careful tempering employed in the production of western cutlery.



LIBERTY PLANE

The Defender Auto Lock Co., Marquette Building, Detroit, has just brought out a timely and attractive radiator emblem in the form of an aeroplane, named "The Liberty Plane" emblem. Its novel construction and appearance are particularly appealing at this time, when every owner desires to express on his car in some manner his patriotic sentiments and interest in war preparations. The emblem is a splendid miniature of a "Liberty Plane," cast in aluminum, highly polished and decorated with the American flying emblem in red, white and blue enamel on each wing, and is weatherproof. The slightest breeze starts the propeller blade whirling, giving an appearance of action and speed at once novel and striking.

WORM STEERING GEAR FOR FORDS A QUICK SELLER.

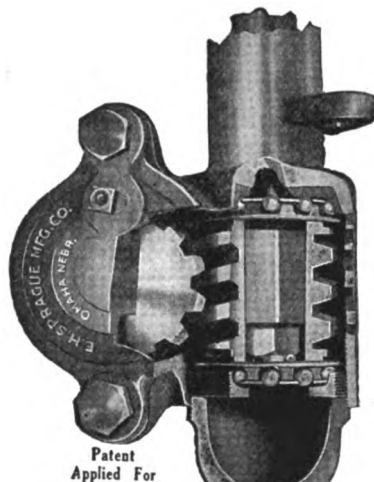
Garage men and accessories dealers report a rapidly growing demand for the Sprague Worm Steering Gear for Ford cars, put on the market by the E. H. Sprague Manufacturing Company of Omaha, Neb.

The gear appeals to Ford users as an improvement that makes the Ford a much safer car to drive.

The first model of the Sprague Worm Steering Gear for Ford cars was sold last season. "Unfortunately," said Mr. E. H. Sprague, president of the company, "this model required adjusting wherever the steering rod was out of alignment or any connecting part not in perfect order, and some of the purchasers failed to get it on properly. In every instance of this kind reported to us we replaced the gear or refunded the money.

"In our new 1918 model we have eliminated all necessity of adjusting. This model can be put on in half the time. It

Accessories and Supplies of Interest to the Trade



Patent
Applied For

E. H. SPRAGUE
Ball Bearing Floating Post
Worm Steering Gear
For Fords

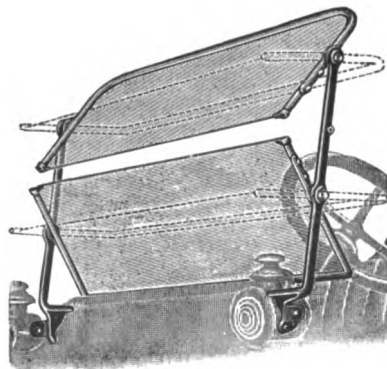
fits any Ford. With ordinary care it cannot get out of order. We have also added ball bearings, which improve the action and reduce wear."

The Sprague Worm Steering Gear enables a Ford driver to steer easily out of dangerous ruts, and through mud, sand or on center-crowned roads. It holds the car to the road, prevents cramping or buckling when the front wheels strike a bad place, prevents locking over center and greatly reduces danger of skidding.

Dealers make a liberal profit and an additional charge for installing. The gear retails at \$15.

OSPECO VENTILATING WINDSHIELD

Now that summer is at hand the regular Ford windshield does not fully answer



OSPECO
PAT. PEND.

partment A.B., Ford Bldg., Detroit, manufacture the purpose, for it does not permit sufficient ventilation for keeping the lower part of the automobile body cool.

The Michigan Auto Products Co., De-

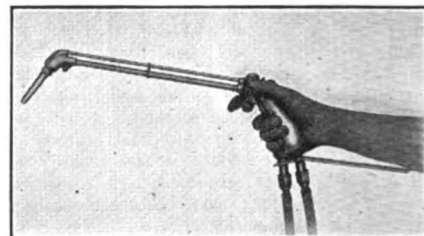
facture what they term as Ospeco windshield parts, consisting of two heavy brackets which attach to the front section of the Ford body and carry the regular Ford windshield in such a way that the two halves may be tipped in practically any direction as shown in the accompanying illustration.

A NEW WELDING TORCH

One of the best known designers of Welding apparatus, Mr. Elmer H. Smith, a practical welder of many years' experience, has perfected a torch which is in many ways unique.

It places the entire control of the flame in the hand that is holding the torch. The oxygen and acetylene are controlled by the first finger and thumb, working on triggers. The flame is lighted by a pilot light which makes it possible for the operator to take the torch from its hook, light and adjust the flame, without employing the other hand at all, and have the torch ready for work inside of two seconds.

The pistol grip feature means great comfort for the operator, particularly on long jobs, because in connection with the arm rest the torch becomes wonderfully



easy to hold and unusually convenient to handle.

The efficiency of the torch is greatly increased by the fact that each tip contains its own mixing chamber which is exactly the right size to produce the best results for that tip. The danger from backfiring is eliminated by the check valves in the grip which protect both hose lines and make it impossible for the lighted gas to back up into the cylinder or generator and cause an explosion. The hose lines are equipped with automatic shut-off valves which close the line when detached from the pistol grip.

In an emergency the operator may shut off the acetylene and convert the torch into a cutting torch by increasing the oxygen pressure without so much as laying the torch down, and can re-convert it into a welding flame at the touch of the finger.

In economy this torch is remarkable because of its many time-saving features. The pilot light enables the operator to put the torch out when for any reason he has occasion to lay it down to use both hands on his work. This results in a considerable saving in gas in the month's work.

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VOLUME 17

JULY, 1918

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WAR AND THE AUTO BUSINESS.

So many cuts in automobile production have been made or reported from time to time that it would lead some to believe that automobile production has about come to a standstill, which is far from true. It certainly is true though, that the government's needs for materials have made heavy reductions in output necessary. Consequently it follows that the number of cars manufactured today is far below normal and the prices for those that are being made are constantly being raised, hence it follows that several things will naturally result—the man of moderate means will either not buy the car that he has been considering for some time or he will buy a good second hand car. Again, the man who has an old car will hang on to it. He won't try to trade it in on a new one. In both of these instances the number of repairs will be greater than under normal conditions.

Another result of the war is that so many of the younger men in the auto repair field have been drafted from the cities that in a great many instances it is no longer possible for the shops to care for the work and as a result this work is being scattered around over considerably more territory than it has been in the past.

Further curtailment of automobile production will be necessary and is coming.

Any way the situation is taken, it means that the repairman in the smaller towns is to benefit largely therefrom as the smaller the production the larger the number of old cars needing repairs and of course the older the car the greater this need becomes.

Usually when a car becomes too disreputable in appearance for passenger service it is converted into some sort of a truck and this again lets someone in for profits. All in all it can be said that the ill winds of war that are blowing no good to a great many are certainly wafting some favorable and profitable breeze in the direction of the auto repairman.

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DON'T GIVE MONEY TO AGENTS

The American Blacksmith, Auto & Tractor Shop DOES NOT employ subscription agents. Any person representing himself as such is an impostor and should be so dealt with. Notify us immediately if anyone claiming to represent this journal calls upon you.

WHO'S GETTING THIS MONEY,

There are nearly thirty million automobile tires in use and increasing at an amazing rate.

There are not nearly enough repair shops to take care of tire repairs and only about twenty-five per cent. are able to take care for all sorts of tire repairs.

The number of tire repair shops now in business is far too inadequate to meet the demand and as the number of automobiles is increasing by leaps and bounds (1,629,325 more cars being registered during 1917 than the year before) and many tire repair men have been taken by the draft from their occupations, it can be seen how great is the need for more repair shops doing this work, at once in every locality in the country.

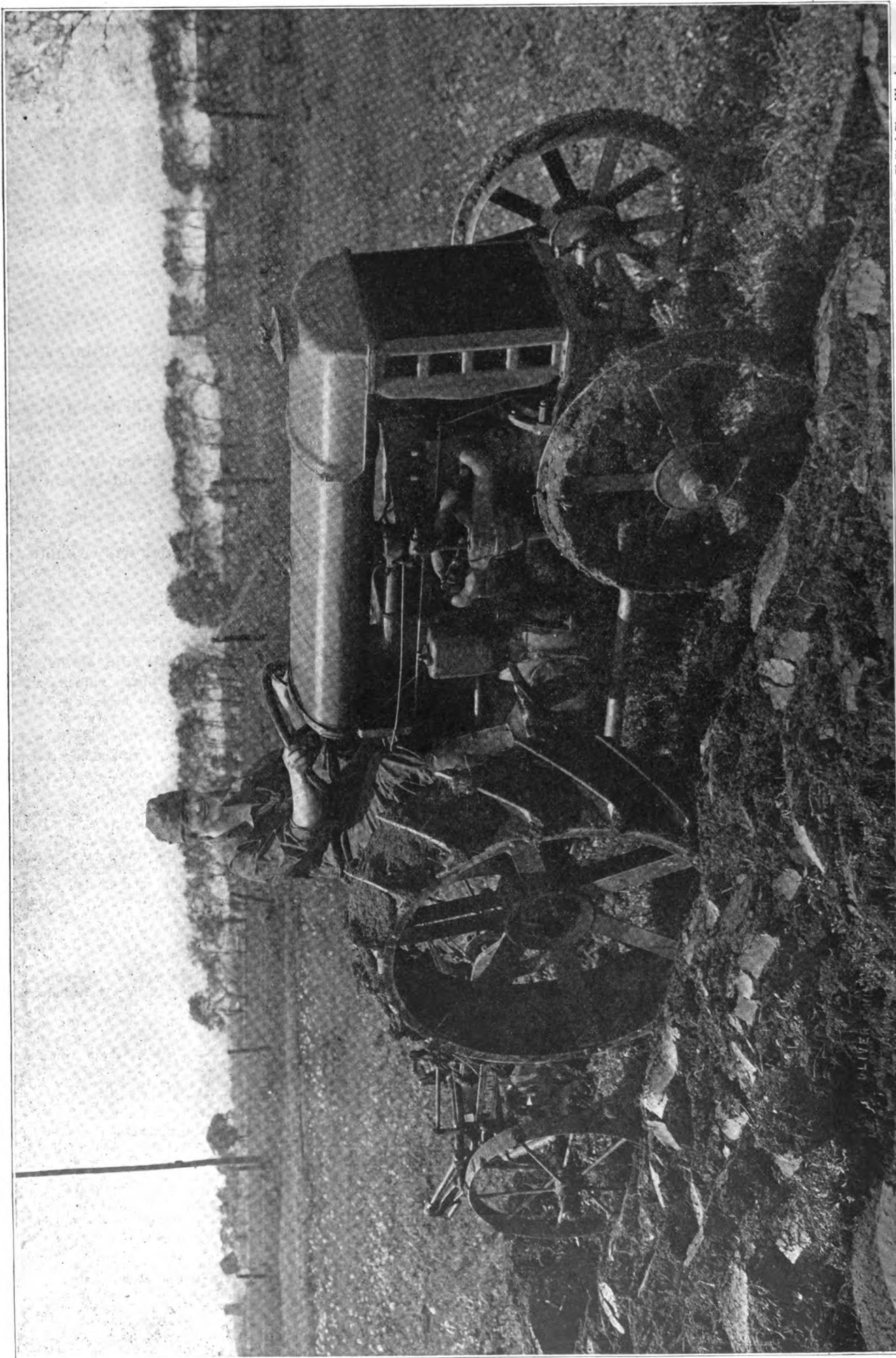
Every automobile owner uses on an average of eight tires per year and his punctured, cut and worn tubes and casings are repaired many times before they go to the junk man as hopeless.

Who is getting this class of work in your neighborhood? If you aren't getting it someone else is or if there is no tire repairman in your town this work is going to some other town to be done.

Investigate This Business, then see for yourself what you are passing up in the way of quick, sure, and easy profits.

Welcome!—"I used to read the American Blacksmith years ago in southern Minnesota. Am running a very successful business here in Idaho but at times, especially during slack times, I feel myself losing interest as the business is so different from what it used to be so I am subscribing again as a stimulant or a tonic any way you care to put it. I have been at the business for 30 years and good blacksmiths are very scarce in this section of the country.

T. K. Hausen, Idaho.



AH-HA! NOW WE UNDERSTAND WHY THERE IS SO MUCH ENTHUSIASM ABOUT THE FORDSON TRACTOR AND WE WILL ADMIT THAT THIS PICTURE ISN'T THE LEAST BIT HARD ON THE EYES.
Photo from Oliver Chilled Iron Works.

The Latest Ideas for the Camping Car

ALBERT MARPLE

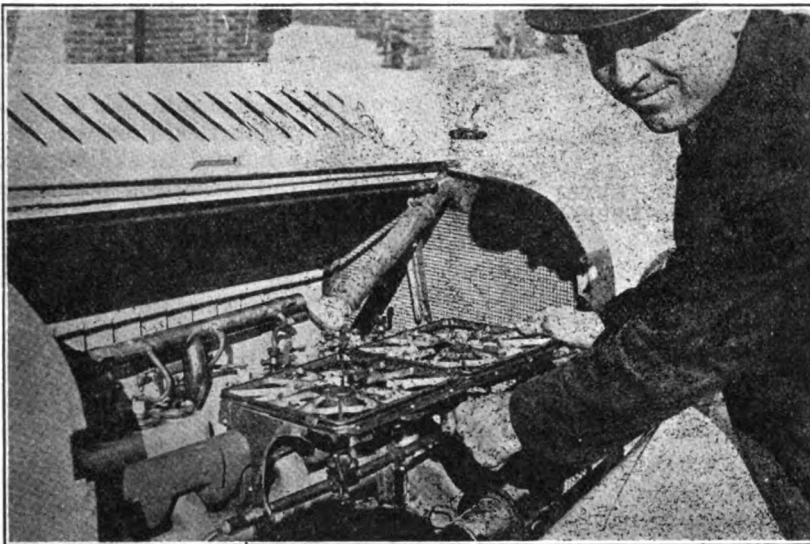
AUTOMOBILE camping trips are becoming more and more numerous with the passing of each outing season, and especially is this true in the western part of this country. Motorists are literally wild about camping, and it is not an unusual sight to see camping parties coming from or going to the hills. It seems as though the "call of the hills" is irresistible, and that just now the great mass of motorists are beginning to realize this. A motorist one time

illustrations accompanying this brief story. While this Chandler car is of unusual shape, it was not constructed, except for a very few features, exclusively for camping, but it is just these few features that put it in a real camping car class. These camping devices as well as the remainder of the body, were designed by A. G. Sharkey, mechanical foreman for a Los Angeles, Shop, and immediately after completing the machine Mr. and Mrs. Sharkey embarked in it

upon a camping expedition which included Lake Tahoe, Yosemite Valley, Drakesbad, the Lassen Peak country, etc.

This automobile is built very much the same as a yacht. The body is narrowed and rounded at the stern, with the widest part in the middle, narrowing again as it approaches the cowl. It is fitted with a canopy top and is equipped with curtains which enclose it completely and makes it rain-proof. The roof is very rigid and may be used for supporting small round glass windows to admit light to the tonneau when the curtains are drawn.

One of the most important features about this novel car is the sleeping accommodation. By use of a special hinged device the seats of the car may be converted into a bed. The rear of the front seat falls backward and the cushions of this seat comes forward. In the same way the rear seat comes forward completely filling the intervening space, and the result is a splendid upholstered bed furnishing ample room for two persons. The cooking arrangements of this outfit are also of interest. The two-burner gasoline stove has been located beneath the hood, being clamped to the manifold of the engine, as may be seen by one of the accompanying pictures. The gasoline supply is taken from the main feed

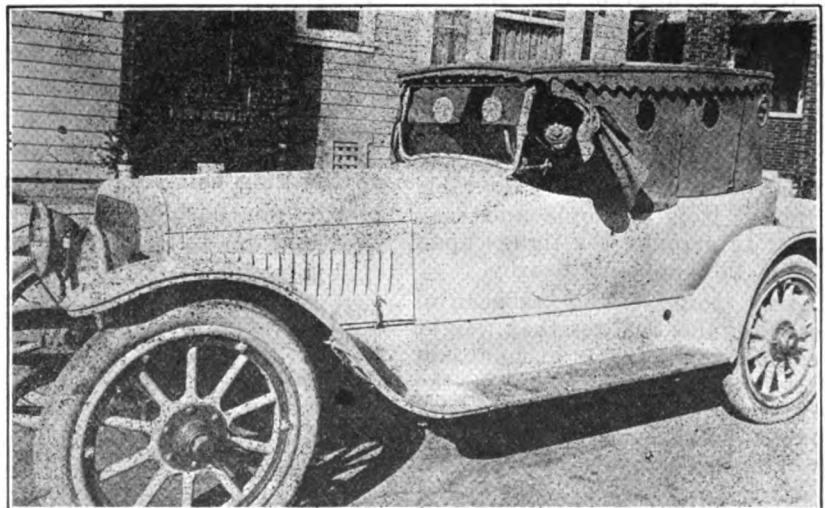


OBSERVE, IF YOU WILL THE CLEVER ARRANGEMENT OF THE GASOLINE STOVE. NO SMOKE TO BLOW IN YOUR EYES NOR ASHES TO GET IN YOUR HAM AND EGGS. HAVING ALL THE COMFORTS OF HOME IN AN AUTOMOBILE—WHY LIVE IN A FLAT?

said that a camping outing was just like some kinds of medicine—"Once tried, always taken."

But for the outing trip in the mountains the camper should be prepared. This business of cooking the meals by holding the frying pan over the blazing fire and eating off the ground may be all right for some people, but most of us want a few "home comforts," like the practical stove, a table that will not fall apart, etc., and to provide features of this kind the motorist must plan in advance, not wait until the camping ground has been reached and then "see what can be done."

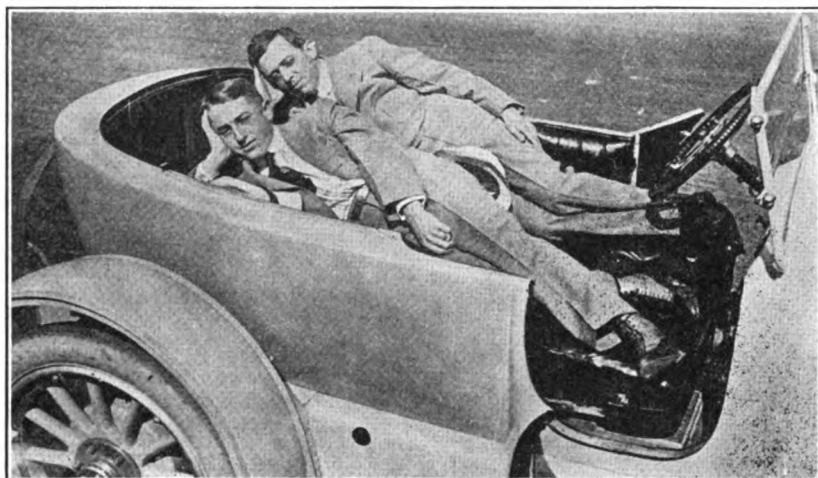
Some idea of what may be done along this "Preparedness" line may be secured by a glance at the



THE RIGID TOP AND THE CIRCULAR CURTAIN LIGHTS STRONGLY SUGGEST A MOTOR BOAT CABIN.

line to the carburetor, special precautions being taken against leakage, by all connections being insulated. This is the very latest thing in the automobile camping outfit to make its appearance, and is far ahead of the open camp fire or the folding stove. One advantage secured by the use of this arrangement is that after the meal

poles have been done away with, this cutting down the load between 75 and 100 pounds; cots, weighing between 15 and 20 pounds each, have been eliminated, as has the bulky camp stove, etc. The bedding is rolled and wrapped in a canvass and strapped to the running board. Provisions, cooking utensils, etc., are carried in the cup-



YOU'VE ALL READ THE STORY ABOUT "THREE MEN IN A BOAT"—THIS IS A PICTURE OF TWO MEN IN AN AUTO, PERFECTLY SATISFIED AND COMFORTABLE IF ONE IS TO JUDGE FROM THE SERENITY OF THEIR EXPRESSIONS.

is cooked it may be left upon the stove and kept warm by the heat from the engine. When not in use this stove folds over against the top of the engine and out of the way.

In camp the dining room accommodations are also of vital interest. In this outfit a long, specially-designed cupboard is strapped to the running-board of the car, and to the inside of the outer wall of this is an iron framework which supports the table. This table is a roll-top affair, similar to the tops of desks, and when it is desired to "set the table" it is simply necessary to raise the top of the cupboard, lift the iron support and unroll the table, placing a pair of wooden legs beneath the outer corners, the inner side being supported by the framework of iron. With the table in place, it is a simple and easy matter to arrange the things upon it from the cupboard nearby.

Every motorist who has been in the mountains realizes that weight is an important factor in mountain climbing. It very often is the dividing line between pleasure and trouble. In the construction of this car it was endeavored to eliminate as much weight as possible, and it will be seen that this object has been accomplished to a remarkable degree. The heavy tents and tent

board, in addition to which a food compartment has been arranged at the rear of the car. It costs actually no more and possibly less to fit the camping car up correctly, than it does to carry along upwards to a ton of freight in the form of beds, tents, stoves, tables, etc., while with the lighter load the car will hold up better, tire trouble will be less, and the machine will, in all probability, not be a fit subject for the shop upon the return from the trip.

STEERING TROUBLE

The front wheel spindles upon which the wheels are mounted turn on the king bolt or pin. There are bronze pin bushings to take the wear, but due to lack of lubrication the bolt often "freezes" in the bushing and then the bolts turn around, causing wear where there is no renewable bushing. In a case of this kind, the king bolt should be removed by first removing the castellated nut at the bottom. After cleaning the bolt and the part it fits into, oil copiously and replace. Tighten the nut well.

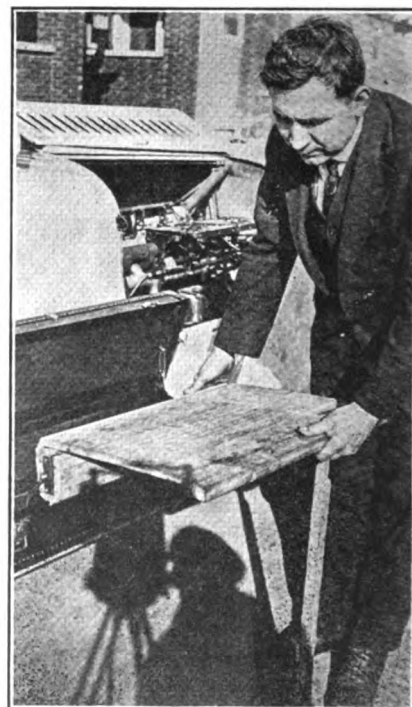
BOOKLET TELLS SHIPYARD SECRETS

A little volume entitled "Shipyard Employment a Place for Men to Help Win the War," has just been issued. This book was prepared at the request of the Industrial Service Department of the United States Shipping Board Emergency Fleet Corporation, of which Meyer Bloomfield is the head.

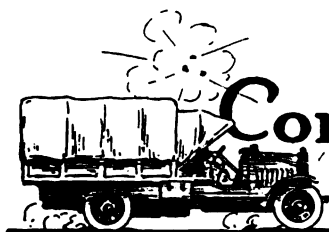
The volume goes into a detailed description of a modern steel shipyard written with a view to inform the green men of what they will find when called. There is a comprehensive outline of the various kinds of work necessary in ship construction. The requirements of the different classes of workmen are set forth in detail, and the reader is carried along from the laying of the keel, through the various steps of construction to the actual delivery of a completed vessel.

This work should be a valuable addition to shipyard literature, and especially helpful to skilled men of other trades who contemplate going into the yards to help build our new merchant marine.

Anyone connected with or interested in shipyard work who wishes to obtain a copy of this booklet can do so by applying to the office of Mr. Bloomfield, 602 F. Street Northwest, Washington, D. C.



THE TABLE ROLLS UP IN JUST THE SAME WAY THAT A ROLL TOP DESK DOES.



Convoy Workshop Experiences in France

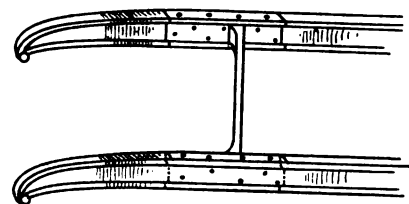
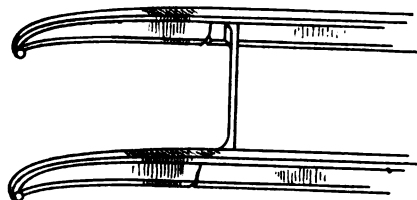


T. Northwood

Approved by British Postal Censorship

In the last number of the American Blacksmith Auto & Tractor Shop I told something of my preliminary experiences with our convoy and promised to tell something of troubles that followed.

After about six months work and winter began to set in on us our troubles began to increase and as the roads by this time were going from bad to worse we were getting broken chassis and side rails galore. At first the broken cars were evacuated but we soon found out that if we were going to keep the convoy up to its full strength we would have to set about and repair them ourselves, although rather a large job for a traveling workshop with only a limited number of appliances at hand to work with. At first we tried acetylene welding to repair the side rails, as our officer commanding had hunted up a new set for this purpose, but these welds would not stand the strains to which they were subjected although this welding outfit came in very useful for some little jobs that



MANY BROKEN CHASSIS WERE
THUS SUCCESSFULLY MENDED

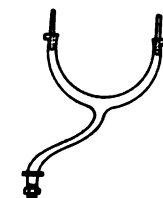
came along. After this failure of the welded repairs we decided to dismantle the whole thing and this was done by first removing all of the body bolts and then raising the body up and drawing the chassis out from underneath. At one place

we were fortunate enough to have the assistance of a big crane that happened to be in the building as the place had previously been an engineering shop. In nearly every case the break occurred by the side of the gear change levers and occasionally both sides would be broken, as will be seen by reference to the illustration. After removing the controls, universal joint, clutch, gear box, and cross member we were then able to get at the broken parts with ease. After removing all rivets and bolts we then made a new channel plate three feet long out of steel plate of the same thickness as the broken member, making a good, snug fit in the broken channel and securing it in place with a liberal number of three eighth inch rivets which were driven hot to obtain the best results, afterwards shortening the cross member to allow for the thickness of the new plate. In this job care should be taken in the first place to fix a lifting jack under the fracture and to bring the edges of the broken parts well together before attempting to fit the new plate or drill new holes. The job completed the various units were reassembled in position and the chassis was run underneath the body which was lowered into its old position and the job completed. This job carried out in this way was a great success, giving longer service before they gave away.

About this time the cars had been in constant and active use for seven or eight months and we received orders to retire out of action to some convenient place for a month's rest to enable the workshop party to give the engines an overhauling, not a valve or a base having been removed from them up to this time and which speaks highly of the efficiency of the Sunbeam engines.

We had just become nicely settled down in our new location and had gone over a couple of engines when, for some reason unknown to us, the convoy that had replaced us were experiencing a streak of bad

luck and, I suppose, got a lot of cars hung up so they got notice to get out and we got notice to pack up and get in again. The result was that we were back again on the old ground in about seven days and carrying on as before. This same thing happened on two occasions within a period of two months. This was in our first winter when the weather was at its worst and the roads on the Somme were indescribable and to have gotten out of it for a few weeks would have been a Godsend, especially for the drivers.



MR. NORTH-
WOOD'S LAMP
BRACKET RE-
PAIR

One of the most common jobs brought into the workshop were the lamp brackets with the tops broken. At first I used to forge new top ends and weld them on about four inches down but as the brackets had to be straightened out and jumped up before welding this job occupied considerable time and with only a small forge at our disposal. So I adopted another method which answered the purpose just as well and saved coal and labor and made a neat job. This was done by drilling a hole about an inch and a half deep into the body of the bracket and making the stud a good driving fit and a one eighth inch pin through about an inch from the shoulder completed the job. The illustration shows clearly how this was done.

On such jobs as repairing wing stays, brake rods, spanners, etc., I found it more satisfactory to forge out a new part entirely which gave a much stronger part than a welded up job.

A motorist in 1899 said: "My seven days' traveling, however, was not done on consecutive days, as the motor always had to rest from one to three days after a few miles' run, before it could be persuaded to operate again."

Ignition, Starting, Generating and Lighting System on Automotive Vehicles

C. L. WHITE

As stated in the preceding article we need at least six volts pressure of electricity on the automobile in order to properly produce a spark from a modern jump spark coil. We also mentioned the fact that batteries may be likened to water pumps and as the dry cell has an approximate voltage of one and one half one could say that this is the pressure or height to which the pump (dry cell) could force the water (electricity). To illustrate this analogy see fig. 1.

Here we have connected the pumps so that the first one at the bottom discharges into the suction of the second, which in turn discharges into the suction of the third, etc. Thus the first pumps the

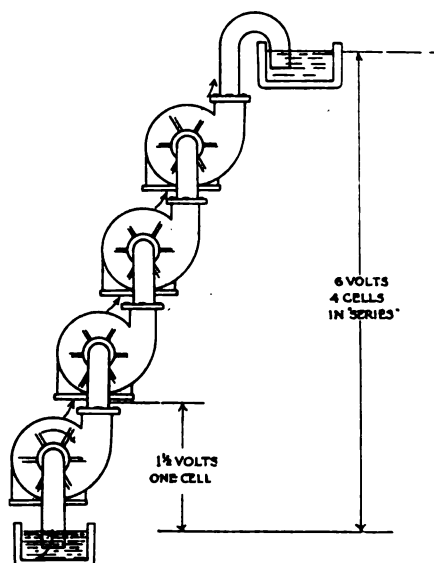


FIG. 1 LIKENS THE BATTERIES TO PUMPS CONNECTED TOGETHER.

water electricity up to one and one-half and the second pumps it up to three (volts of feet) etc. In this way four cells thus connected in what is called "series" connection actually totals up six volts. However it is customary to connect up five cells and so obtain all the voltage necessary to give a good spark. Fig. 2 shows such a set of dry cells properly connected up.

While such a set of cells give excellent service when used only occasionally, yet if it is necessary to use the dry battery considerably it is best to use series-multiple sets. Such sets consist of two or three of the five connected in series. Such sets decrease the electrical dis-

charge from each series of five and so increase the life of the entire battery. Dry batteries give best service when the discharge rate is kept very low.

Dry cells are "tested" by finding their ampere discharge ability when short circuited thru an am-

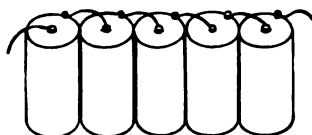


FIG. 2 BATTERIES CONNECTED IN SIMPLE SERIES.

meter or so-called dry battery tester. New cells show 20 to 30 amperes. By "short circuited" is meant the direct connecting of the tester across the two terminals of the cell. Each cell is tested separately. The tester should be connected across the cell terminals just long enough to get a correct reading of the tester. If the short circuit remains on too long the cell will be considerably weakened. Figure 3 shows a cell being tested and also shows the series-multiple sets as they are connected inside. Such sets are obtainable from manufacturers all made up in suitable cases, practically waterproof.

It is not necessary to test the voltage of dry cells as it remains practically constant throughout the entire life of the cell. Speaking generally, dry cells are useless for automobile work when the amperage falls to 6 amps. A few ignition systems will produce a satisfactory spark when the cells are as low as 4 amps. but then there are a greater number that will not give good service much below 7 amps.

Troubles with dry batteries are usually caused by carelessness in placing them in the battery box. They should be securely wedged or tied so that it is impossible for them to jar around and allow the terminals or parts of the bared connector wires to touch and thus "short" and kill a cell or even the

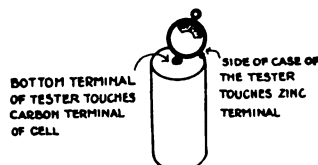


FIG. 3—TESTING DRY CELL WITH AN AMMETER.

entire battery. Dealers are required to test the cells before sale and purchasers are urged to make sure that this is done. Terminals should be tested for tightness,—the screws being tightened with pliers,—too heavy turning will twist the screws off.

STORAGE BATTERIES.

While a thorough discussion of the construction, maintenance, care and repair of this very important part of the modern gasoline automobile would naturally be a part of this series of articles, yet as an excellent series is now running in this magazine it will not be necessary to include it here.

The Storage Battery became a necessary part of the automobile when the electric self-starter was added. The dry battery does not have a large enough ampere discharge rate to crank an engine. Besides, even if the rate was large enough the dry battery would be

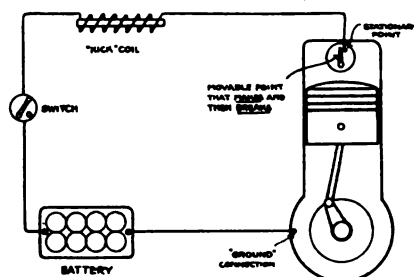


FIG. 4 WIRING DIAGRAM OF MAKE AND BREAK IGNITION SYSTEM.

greatly weakened each time it was called upon to crank the engine and as it cannot be re-charged, it would soon become exhausted and useless.

The reader should carefully study the series of articles on storage batteries now running in this magazine.

IGNITION PRINCIPLES.

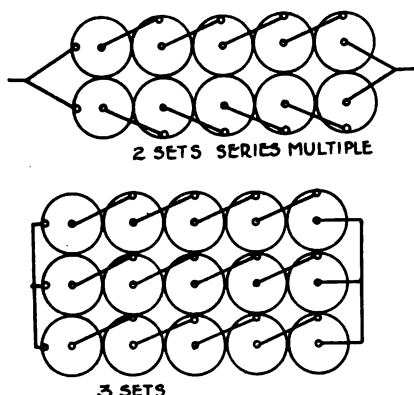
In discussing the principles that underlay the ignition systems used to ignite the explosive mixture in gasoline engines we must recognize the fact that there are really two general systems of ignition, make and break, and jump spark. It is true that the make and break systems have been almost entirely superseded by the jump spark yet we will discuss the make and break very briefly in this article.

MAKE AND BREAK IGNITION SYSTEMS.

In this system of ignition the spark occurs between two points

when they separate (break) quickly. These points are located in the combustion chamber or cylinder head and are operated by suitable trip mechanism that causes them to be snapped apart at the proper time, at the top or before the piston reaches the top of the compression stroke.

The coil used is a simple inertia or so-called "Kick" coil made of a winding of primary wire (like door



BATTERIES CONNECTED IN MULTIPLE-SERIES.

bell wire) wound around a soft iron core. The simplest way to understand the action of this coil is to think that the electricity, when it starts to flow around thru this winding gets up so much momentum or speed that it cannot stop the instant the sparker points separate, but keeps on flowing for a brief instant and so produces the spark. Successful and economical operation of the breaker points of the Make and Break system requires that the points be clean, that they "make" firm contact and snap apart not more than $3/32''$. If the points remain in contact too long the consumption of battery current will be great.

Figure 4 is a circuit diagram for a single cylinder engine using Make and Break ignition. Magnetic plugs have been used in which the break of the points was produced by electromagnetic action in the plug itself instead of by mechanical trip mechanism which used to be the most common ignition system used on marine gasoline engines.

The reader can readily test out the principles of the "kick" coil by winding a number of turns (50 to 100) of common door bell wire around a bolt or spike and connect a set of two or more dry cells to one end of the wire from this "coil" and snapping the other end of the

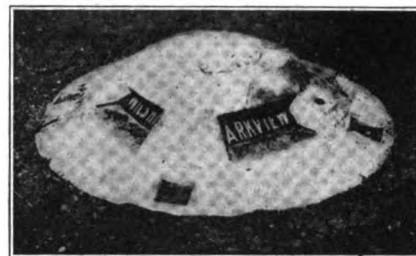
wire against the other end of the battery. Hot snappy sparks should result as the contact is broken. It will also be noted that the bolt or spike becomes quite a strong electro-magnet. We will discuss the significance of such magnetism in the next issue when we will deal with Jump Spark Ignition Systems.

A DAY AND NIGHT CORNER MARKER

Something new to make its appearance out in Los Angeles, California, is the illuminated corner dot. This feature, which is shown in the accompanying illustration, is believed to be the most effective traffic marker thus far presented for night use, while at the same time it does its work equally as effectively throughout the house of the day. This marker is shaped like the metal trench hat worn by the "Sammies" in France, and is fastened to the street by means of long spikes. Directly beneath the center of this feature a small section of the street has been cut away, this forming the battery room. The dry cell batteries are passed to the battery compartment through a round opening in the top of the marker. Although the electric light used to illuminate this feature is of small candle power, it does its work very effectively.

Another feature about this marker is that it gives the names of the streets, at the intersection of which it is located. These names appear in white upon a background of red. The name openings are about three

inches wide and six inches long, while the diameter of the marker is about sixteen inches. The letters

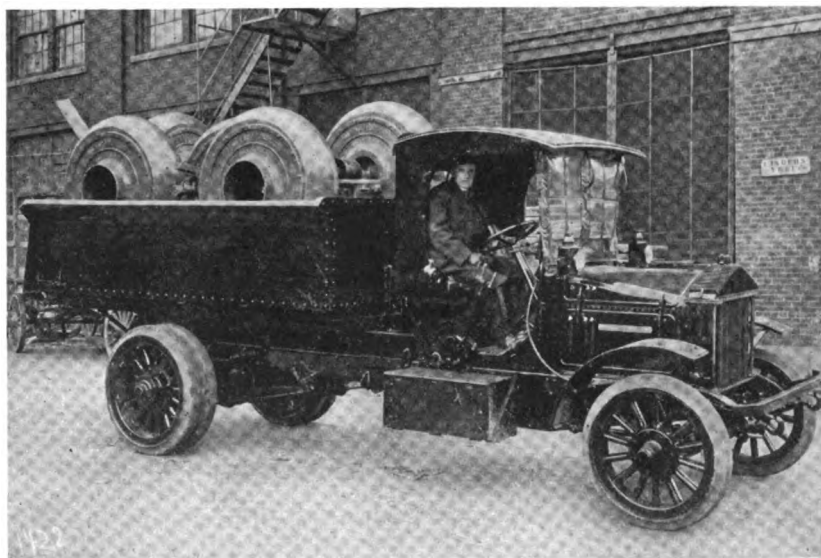


DAY AND NIGHT ROAD MARKER.

of the street names are about two inches in height and may be easily read by day as well as by night.

TO ADJUST BEVEL GEARS.

In many cars the cover of the bevel drive gear case is at the rear of the housing and it is impossible to see the place where the teeth of the gears mesh, when it is necessary to adjust them. Take off the cover and clean off the gears and clean off the case. Next pour into the bottom of the case about a tea cup full of cylinder oil. When this has had time to settle, it will be found that by holding a light in the top of the case above the bevel gear and pinion, the reflection in the oil will show very plainly where the bevel gear and pinion mesh, so that adjustments may be made.



A BIG TEXTILE PRINTING COMPANY IN FALL RIVER, MASS., BOUGHT FIVE BUFFALO B VOLUME EXHAUSTERS AND A PIERCE ARROW TRUCK—THE TRUCK DELIVERED ITS LOAD WITHOUT MISHAP OR INCIDENT

Great Wartime Farm Efficiency Demonstration

A great war-time, farm-efficiency demonstration. That is what the national exposition of trucks, tractors and accessories at the Municipal Pier, Chicago, is going to be. The exposition will last a week, September 14 to 21.

The first and second days, Saturday and Sunday, will be "curiosity seekers' days." Monday Tuesday the hardware men of the country will attend the convention because hardware dealers everywhere are getting in line to handle automobile accessories, and parts for trucks and tractors—and some of them are already agents for this machinery—along with their regular line of hardware.



THE CORRELL PRINTING PRESS IS ONE OF THE MOST IMPORTANT PIECES OF EQUIPMENT HE HAS. —"IT PAYS TO ADVERTISE."

Wednesday will be Illinois day, when farmers from the state will have the right of way to all parts of the magnificent pier—that is to all parts except the quarters of the U. S. Navy training school for Ensigns. Those who wish to see the Jackies at work will have to ask permission of the sentries. But the sight will be well worth seeing.

And Thursday and Friday the threshermen of Illinois, Wisconsin, Iowa, Indiana and Ohio will hold a convention in the auditorium, nearly a mile from shore, as guests of the exposition committee.

There are more exhibitors already signed up for this great exposition than the total number at the 1917 show which was held in the Coliseum, and there are still more than two months left before the show opens. Manager Buelow believes that before that time there will be twice as many exhibitors. It is interesting to know that the space already contracted for is so much greater than the total floor

space of the famous Coliseum, that the Coliseum would seem small if set down in the area reserved for the Automotive and Accessories Exposition, Inc., which is the official name of this national exhibition.

An enthusiastic meeting was held a few days ago at the Pier in preparation for the opening of the exposition, and many men prominent in various phases of farm improvement delivered inspiring talks. One of most interesting statements was that of C. C. Parlin of Philadelphia, formerly principal of the Waupaca, Wis., High School, who said that contrary to general opinion, there were more horses in the United States in 1917 than ever before, the U. S. government estimating the total number at 25,000,000.

William G. Edens, president of the Illinois Highway Improvement Association, explained the plans to "lift Illinois out of the mud", by voting for a \$60,000,000 bond issue at the next fall election. Not one cent of this money is to be spent until after the war, and at that time the work will prove of tremendous value, not alone to everyone who uses the roads, but in giving employment to thousands of returning soldiers.

Hugh McVey, of Topeka, Kas., predicted that the truck, tractor



A PEEP INTO MR. CORRELL'S OFFICE FINDS THE BOSS ON THE JOB.

and accessory exposition would prove as great a factor in helping to win the war as did the harvester, which appeared in Chicago and went from Chicago to the adjoining states at a time when the Civil War made it vitally important to raise and harvest more wheat with fewer men in the grainfields. Illustrating the importance of improved

farm machinery, Mr. McVey pointed out that in Nebraska the value of the farm products has increased in the last 20 years from \$100,000,000 to \$900,000,000—nine times as much on very nearly the same acreage.

E. E. Parkinson of Madison, Wis., told how the threshermen, loyal to the core, are putting their outfits in the best possible condition for the threshing season. They have lost many trained men, but their determination is splendid,

The Correll Shop & Store.

Dealers in "Everything the Farmer Uses"

Dear Friend,

It takes a lot of money to operate a shop and a 'private banking business' at the same time and we've not got that much money.

We're not able to 'carry' your thrift stamps or liberty loans, nor 'operate' your business and ours too. And at this time, when every one is contributing to the 'War Chest', it's not so easy to borrow money to 'carry us over' as it was in the past.

In fact, the whole situation 'simmers down' to the statement that we can't handle your account unless you settle ONCE EACH MONTH.

So please regard this statement as a courteous request to 'do your bit toward keeping things moving' and arrange to pay the amount it represents.

Very truly yours,
CORRELL

A TIMELY SERMON ON THE DISADVANTAGES OF UNLIMITED CREDIT.

said he. This exposition is an opportunity to render a big service to the people of America by showing what modern methods can do to save man power. Incidentally he paid a tribute to Wisconsin farmers who, in spite of a very bad showing of winter wheat, stand to harvest 6,000,000 bushels of spring wheat where last year the harvest was 3,000,000 bushels. Things like that will help smother the disease of Prussianism.

Frank B. White told of tractor development, and he estimated that by using tractors instead of horses the farmer saves 60 percent of manual labor and 50 percent of horse labor.

Mr. White told a story which provoked hearty laughter. A little boy read in the evening paper that a single fly produces 4,000 young in one year. Turning to his father the youngster asked, "If a single fly can raise that many, how many can a married fly raise?"

The municipal Pier, where the exposition is to be held, is just off the "loop", and street cars run clear to the end. It is also reached by harbor excursion boats which connect it with Lincoln Park to the north and Jackson Park to the south.

A SYSTEMATIC METHOD FOR INSPECTING A SECOND HAND GASOLINE MOTOR BEFORE PURCHASING.

C. L. WHITE

Every purchaser of a second hand motor desires to obtain one that will give him the best power for the time, energy and money invested. He must, therefore, make sure of just how much of an investment the motor in question will represent after he gets it and gets it going. In other words, he must find out how many repairs or replacements will be necessary. Here are some of the mechanical requirements:

Good compression. Tight crank and shaft bearings. Flywheel tight. Pump in good condition. Timer in working order and points O. K. Carburetor of good make and not leaking. Coil points not badly worn or burned. If magneto, inspect points and try spark. Appearance and general condition good.

First—Compression—If at all suspicious of those who are selling it is best to have some coal oil (kerosene) put in each cylinder and turn the engine over to work out any extra heavy oil that may have been put in the cylinders to make the compression "good," or at least seem good while the motor remains cold. This has been done by unreliable dealers, and is very effectual even when the engine has a scored cylinder wall.

Now try the compression by rocking the flywheel over against the compression and noting the rebound. Try this for each cylinder and note differences, if any. Crank each piston over top of compression stroke, slowly, and notice how each *holds* its compression. Of course, leaking valves will cause a loss in compression, but as the seller is anxious to make the motor show to the best advantage, it is reasonable to suppose that he has had the valves

ground in, and it is more than likely that any variation in the compression is due to leaks past the piston caused by scores, or worn rings.

Second—Remove plates or plugs in crank case and inspect the crank pin, and, if large enough for the hand, try for any looseness of the piston pin. Also try for looseness of the crankshaft bearings by lifting on the flywheel, or end of shaft itself. You can also determine at the same time whether the flywheel is loose. The pump should also be carefully looked over. If of the plunger type, loosen the gland nut and see how loose the plunger appears, as much looseness here means continual leaking around the packing. Centrifugal types do not wear out as rapidly. Also inspect timing gears.

Third—Look over the carburetor. It is not usually possible to try for leaks but one can judge by general appearance as to whether it has been knocked around, and whether the knurled adjusting screws (if any) are so worn that they will not *stay put* when once adjusted. While a carburetor of some well known make is desirable, yet there are many very good instruments that are little known outside of their local field.

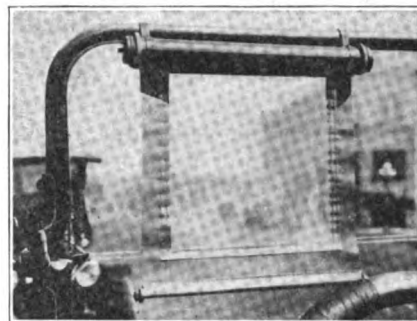
Fourth—Inspect the timer for wear. Badly scored, grooved or humpey segments, will mean an early replacement. If the system is the non-vibrating coil type, then make sure the breaker (timer) points are not worn down to the metal to which they are attached.

Fifth—If magneto is provided, inspect the breaker points for wear and adjustment and try the spark produced by cranking the motor briskly, having an assistant hold one of the plug wires about $\frac{1}{8}$ inch from the cylinder.

Sixth—Look over the motor in general. Note its general appearance

and condition, which is some indication of the care it has received.

A review of this system for inspecting a motor will disclose the fact that each step embraces a certain part of the motor, and its attendant equipment, and for this reason will be easy to understand and follow.



THIS BLIND ELIMINATES ROAD GLARE.

The value of the motor will depend on the condition as determined by this inspection, as well as on the make, model, horse power, year made, etc. These factors must all be considered in judging as to whether the motor is worth the price asked for it.

THIS BLIND ELIMINATES ROAD GLARE

The novel anti-road-glare shade has just been devised by an inventor in the western part of this country. While this affair may be used for killing the glare of approaching headlights at night, its principal purpose is to counteract the effect of the bright concrete or sand roadway during the day.

This blind is 12 inches wide and 14 inches in length. Two adjustable clamps fastened to the side of the blind case, permit it being used in connection with any type of windshield. The central portion of this blind made of celluloid which, on account of its peculiar color, instantly relieves any eye-strain brought about by the glary roadway. This blind works indential to the ordinary blind in the home, and when open and in use it is held in place by a steel rod, which is run along its lower edge.

IRREGULAR FIRING

Moisture on the exposed part of the porcelain will often cause a spark plug to fire irregularly. This trouble may be obviated by greasing the porcelain with vaseline or hard grease. A useful bit of knowledge during a protracted spell of wet weather.

Wagon Boxes and Seat Tops

Lathe Work and Grinding

STAR GARAGE

CHESTER HUMBERT, Prop.

General Blacksmithing
and Repairing

Tires and Accessories

WHEN CHESTER HUMBERT, OUT IN WISCONSIN, HANDS YOU ONE OF HIS BUSINESS CARDS, THE FIRST THING YOU WILL NOTICE IS THAT HE IS IN THE GARAGE AND ACCESSORY BUSINESS AND ISN'T ASHAMED OF IT. ANOTHER THING YOU WILL DOUBTLESS OBSERVE IS, THAT MR. HUMBERT IS A FIRST CLASS MECHANIC AND WE'LL BET HIS CUSTOMERS NEITHER SEE RED NOR SWEAR BLUE WITH EITHER HIS WORKMANSHIP OR HIS CHARGES.

The Care and Repair of Automobile Starting and Lighting Batteries

STARTING and lighting batteries are generally shipped by the manufacturers in containers with triangler tops and with "This Side Up" instructions to the carrier. These precautions are taken to prevent leakage of the solution through the vents due to the battery resting on its top or sides. A further precaution is taken by sealing the vent caps with soft rubber nipples.

(When shipping a battery for any reason care should be taken

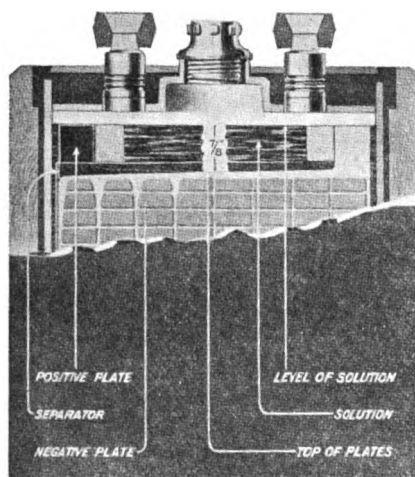


FIGURE 1—CUT SHOWING HEIGHT TO FILL THE CELL WITH PURE WATER.

that it should be packed in a container as above described.)

On receipt of the battery it should be wiped clean of dust and particles of packing, and the soft rubber nipples should be discarded. The case carefully examined for evidence of injury and if there is evidence of damage in transit, claim should immediately be made against the carrier.

Remove the vent caps from the cells and determine the height of the solution in each cell, which should be the height shown in Figure 1. If this is the case there is no indication of a leaky jar.

(Generally every battery is shipped by the manufacturer under full charge and the acid density of each cell is adjusted before it leaves the factory. The battery is also put through a severe test for leaks in order to preclude the possibility of the shipment of a leaky battery.)

Test the solution in each cell with the hydrometer testing set as out-

lined under "Testing;" and then adjust the height of the solution; distilled water, pure, clean rain water or melted artificial ice should be used for this adjustment but wherever possible use distilled

In a new battery the density of the solution in the cells should read 1275 to 1300, or somewhat less, depending on the elapsed time since the battery left the factory, temperature conditions, etc.

If the density of the solution reads below 1250, the battery should be given a freshening charge until the hydrometer reads 1300 in the cells. Care should be taken to charge in the *proper direction; the positive terminal of the battery should be connected to the positive side of the charging system.*

Replace the vent caps, screwing them in tightly, and place the battery on a clean, dry spot for 24 hours as an extra test for a leaky jar, and note whether there is any dampness under the battery.

INSPECTING A BATTERY THAT HAS BEEN IN SERVICE

The foregoing instructions for inspection of a new battery apply fully to one that has been in service. The later, however, may have been subjected to various abuses or may be worn out.

Service Inspection — Generally all battery service stations offer to their customers a regular inspection of their batteries without charge.



FIGURE 2
HYDROMETER
SET

Such free inspection covers testing with the hydrometer and filling with distilled water, and is designed to insure to the customer satisfactory life from his battery, but not to cover cost of repairs. On the basis that "an ounce of prevention is worth a pound of cure," troubles caught at the start can be remedied.

The following instructions should en-

able the repairman to get to the seat of the trouble that may exist.

Testing—The instruments generally used for testing starting, lighting and ignition batteries are the Hydrometer Set, the Voltmeter and the Ammeter.

The Hydrometer Set — The one indispensable instrument for test-

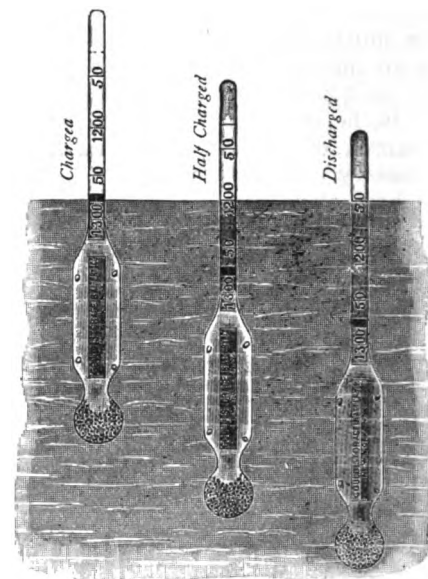


FIGURE 3—CUT SHOWING STATE OF CHARGE OF CELL AS INDICATED BY THE DENSITY OF THE SOLUTION.

ing a storage battery is the hydrometer set, Figure 2. This set consists of a hydrometer within the syringe, and is used to determine the specific gravity (density) of the solution (electrolyte) in the cell.

The solution consists of sulphuric acid diluted with water. Taking the density of the water as 1000, the density of the solution in a fully charged battery will be 1300. As the battery becomes discharged, this density gradually decreases until the battery is fully discharged, when the density will be 1150. The state of charge of the battery can therefore be determined by the density of the solution.

These densities are at 70 degrees Fahrenheit and will change slightly with changes of temperature. The variation, however, is so small that it may be disregarded.

To Test the Solution with the Hydrometer Set; Remove the vent caps from the cells; squeeze the rubber bulb, then insert the end of the rubber tube in a cell, well below the surface of the liquid. Then slowly release the rubber bulb, drawing the solution into the glass chamber until the hydrometer floats freely. Note the point at

which the hydrometer stem emerges from the solution. This point indicates the density thereof, and, therefore, the state of charge of the cell. Test each cell of the battery in this manner.

Then slowly withdraw the tube from the solution and squeeze the bulb to return the solution in the hydrometer set to the cell from which it was taken.

Hydrometers supplied by some manufacturers have a red band around the stem and when the cell is fully charged the red band is at the level of the solution as shown in Figure 3.

It will be noted in Figure 3 that the position of the hydrometer showing the cell discharged is at a point a little higher than 1150. The reason for this is that it is not considered advisable to allow the cell to reach a completely discharged condition and it should be recharged when the hydrometer reading is from 1170 to 1180.

It may be well to emphasize at this point that the hydrometer reading should *always* be taken before water is added to the cell. The water, being lighter than the electrolyte, will tend to remain on the top thereof, and, therefore, a hydrometer reading taken after the water is added and before it is thoroughly mixed would not be correct.

The Voltmeter—The chief use of the voltmeter is to determine the positive and negative terminals of the cells and the individual cell voltage on charge and discharge. A convenient scale is from 0 to 15 volts. The leads should be equipped with sharp prods.

To Test with the voltmeter press the prods into the terminals of each cell until a good connection is made; when the voltmeter reads in the right direction the terminal of the cell connected with the voltmeter lead marked + is the positive terminal. The positive terminal of one cell should be connected

to the negative terminal of the next cell. If not the cells are not assembled correctly in the battery case and they should be reassembled.

A fully charged cell should read from 2.5 to 2.6 volts, depending on the age of the battery and *while charging current is flowing through battery*. It should read about 1.8 volts when nearly discharged and *while battery is discharging at a current of about 5 amperes*. When a cell is "floating," neither charging or discharging the voltage should be about 2.1.

The Ammeter is used to determine the amount of current flowing through the battery on charge and discharge. In the station, the ammeter enables the operator to charge at the proper rates and also to make capacity tests on discharge. When used in testing a battery on a car it should be connected directly to the battery, to avoid escape of current through grounds, etc., before going through the meter. Never connect any ammeter directly across terminals of a storage battery as a short circuit will result, which may ruin the instrument.

Battery Testing in the car—If the battery is in the car it should be tested with the hydrometer to determine the state of charge of the cells, and to determine if the density of the cells is uniform. The height of the solution should also be determined, and if not at the proper height the cells should be replenished with pure water. If no trouble is indicated, see that the case is clean, wiping with ammonia solution, one part ammonia and ten parts water. See that the terminals are tight and that the battery is held rigid in the battery box.

If the test shows the level in one cell lower than in the others, it is indicative of a leak or that the acid has been spilled from this cell.

If one cell is markedly low in gravity, or if owner complains that he has to fill one cell more frequently than the others a leak or spilling, as above, is also indicated. A leaky cell should be repaired at once.

If, on the other hand, low acid level or low gravity are due to spilling, the battery should be charged and the acid density adjusted.

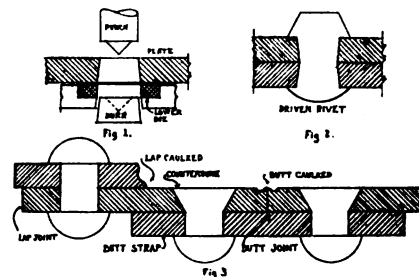
If, however, tests show that all cells are in a completely discharged condition, or the owner complains that he is unable to keep the battery charged, the wiring and start-

ing system should be checked as follows.

First—Point of generator cut in, also the speed of the car at which the generator commences to give the battery its normal charge. Generator systems are designed to give this charge at about 12 miles per hour, and if the generator does not do so it is probable that the battery is not receiving sufficient charge.

It may be that the commutator of the generator is dirty or is covered with oil from the commutator bearings. In this case the resistance between the commutator and the brushes may prevent the generator from charging the battery at the proper rate. The commutator should be carefully examined and if found to be dirty should be cleaned with fine sand paper, *never with emery paper or cloth*.

Second—If the cut out switch is working properly; if not, the bat-

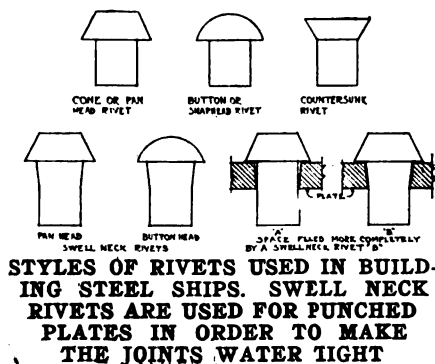


RIVETING AND CALKING FIG. 1. THE PUNCHING MACHINE MAKES A CONE SHAPED RIVET HOLE IN THE PLATE. FIG. 2. A SWELL NECK RIVET IN PLACE. FIG. 3. CALKING JOINTS AND RIVETING.

tery will discharge back into the generator, thus losing power.

Third—The wiring may be grounded to the metal frame of the car, in which case there will be a continual leak from the battery. If the car is wired on the single system, in which case one side of the battery is intentionally grounded, break this grounded connection and shut off the lights and the ignition. Then test with the voltmeter, connecting one post to a battery terminal, the other to the metal framework of the car. This test should be made with all terminals. If the voltmeter shows a reading it indicates a ground in the wiring. When the wiring is on the double system it is not necessary to break any connections.

Fourth—The user may operate a great deal at night and little in the daytime, or he may drive in a congested district at slow speed, or he



STYLES OF RIVETS USED IN BUILDING STEEL SHIPS. SWELL NECK RIVETS ARE USED FOR PUNCHED PLATES IN ORDER TO MAKE THE JOINTS WATER TIGHT

may make frequent stops. Any of these may prevent the battery from receiving sufficient charge, and under these circumstances the user should be instructed to use his lights as sparingly as possible and only to use the headlights when absolutely necessary. In some cases side and tail lights of lower candle-power than used on the car may remedy the condition.

If none of these precautions will allow the battery to receive sufficient charge, it should be given a recharge periodically.

For the above tests on the starting system a small ammeter and voltmeter may be used; it is advisable however, to have a combination instrument especially designed for automobile testing work of which a number are on the market. Information on these instruments will be supplied on request.

As various starting systems differ materially in operation, it will be well to apply to the manufacturers of these systems for diagrams and instructions.

Fifth—A frequent source of battery trouble is loose or corroded connections at the battery or the generator. In either case the battery will not receive the proper current on charge or give it out on discharge. All connections should, therefore, be examined carefully to see that they are clean and tight.

—Courtesy Gould Storage Battery Co.
(To be continued.)

THE WORLD'S SMALLEST TRACTOR

Here is a tractor which has been termed "the smallest tractor in the world" and the chances are that it is the smallest thing of its kind in existence. The inventor of this queer-looking but efficient device is P. O. Fredlund of Pasadena, California. This tractor is operated by means of a gasoline engine which is located within the single large wheel, and which itself revolves around the main axle, upon which both the engine and the wheel run. It is claimed that this new type of tractor provides something that the department of agriculture declare has up to this time been lacking—a tractor capable of replacing the horse on the small farm.

As to the adaptability of this tractor to all kinds of farm work it is claimed that this apparatus is so flexible that it may even be used to cultivate the back-yard

garden. It may be used for pulley and belt work in the barn, workshop or pumping plant, or quickly transferred from one farming implement to another. It may be used to either pull or push the implements used in connection with it.

This tractor stands less than three feet in height and is about two feet wide. Practically all of the mechanism, with the exception of only the carburetor, is located within the single wheel or frame. This frame consists of two iron-spoked wheels, joined by channel irons, which form the tires and give the traction. The axle is stationary. It serves as the crank-shaft for the revolving engine of three cylinders, each of which has four inch stroke and a bore of three and a quarter inches. With the speed of between 300 and 400 revolutions per minute, this engine develops between nine and twelve horse power. It has three impulses to the revolution through an ingenious system by which each cylinder charges the adjacent cylinder through a conduit. The charge is controlled by a cut-off, which in turn is guided by a connecting rod. In this engine there are but three moving parts.

The axle of this tractor passes through the hub and carries the frame. It is hollow at either end. On the left side the carburetor or engine feed is located, this being equipped with a 10-foot intake pipe, which carries this intake far away from the dust which necessarily comes with the plowing. On the right side of the frame are the means provided for the control of the clutch, transmission and the

timer. Inside the wheel or frame a lever arm is rigidly secured to the axle and the transmission is partly mounted upon it. The fly-wheel of the motor is located within the engine itself, which is absolutely dustproof.

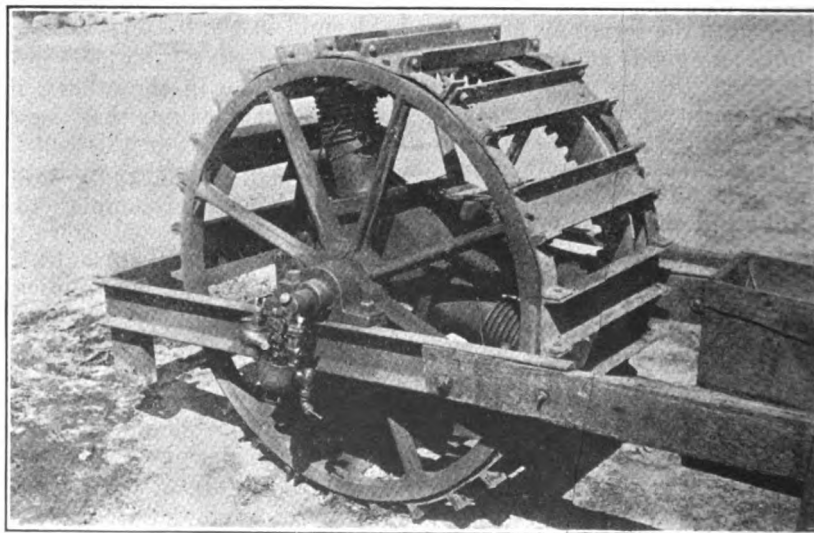
CLEANLINESS SECRET OF GARAGE PATRONAGE

A little grease spot on a lady's light dress or on a pair of white trousers is not a serious thing. The cleaner will take it out in a few minutes for half a dollar. But just this trivial, harmless little spot has often cost a garage many hundred dollars' worth of valued patronage.

The day of the linen duster and old clothes for the motorist has practically disappeared and particularly so where the motorist only drives his car around town or for short distances. One wants to step into a car without any particular preparation and without a thought toward soiled garments.

It is not the easiest task in the world to keep a garage spotlessly neat and all hands the same way. Grease and oil are the natural elements of the automobile. But it has been demonstrated that it is possible to keep them in their proper place.

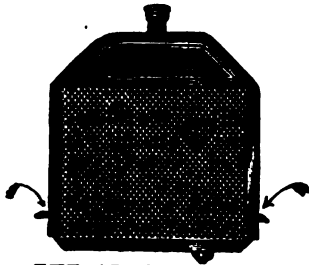
Cleanliness applies with equal force to the owner who looks after his own car. After oiling, making adjustments or changing a tire, take a piece of waste to your hands before touching the wheel, levers or seat cushions. Light summer garments seem to have a particular affinity for rust and grease and the only safe way is to keep them out of the car entirely.



WHAT IS CLAIMED TO BE THE SMALLEST TRACTOR IN THE WORLD IS A SELF CONTAINED AFFAIR THAT FILLS THE BILL ON THE "ONE HORSE" FARM.

BROKEN LUGS ON FORD RADIATORS

One of the commonest troubles the shopman runs across on Ford cars is the breaking away of the supports that hold the radiator to the frame.



THE ARROWS SHOW WHERE THE LUGS BREAK OFF.

There are a number of ways that such broken radiator lugs can be repaired without the owner having to

buy a new radiator. Two of the best plans are here shown.

The arrows in the first illustration shows the location and appearance of the lugs that frequently break. These lugs rest on the frame of the car and are bolted to it.

The illustration at Figure 2 shows a support that can easily be made of one-eighth inch strap iron and is fitted under the bottom of the radiator. This device can be used to strengthen the radiator whether it is broken or not.

In Figure 3 a new bracket is made of sheet metal and soldered securely to the radiator shell as shown by the whitened section. This latter method requires considerable skill to perform properly and besides doesn't help the finish or the appearance of the car. However, there are cases where a repair of this character is the only one that can be made.

WOOD SHOP WRINKLES

A file may be kept from filing up with lead by applying a coat of thin oil just before filing.

A piece of sandpaper or emery cloth is an excellent thing to keep near a gasoline or kerosene can to remove the cap when it is stuck.

Grease a hard running saw with kerosene. This oil will not stain the wood.

Glue that is forced out of a mortise point and allowed to become dry and hard, can be easily removed with a sharp chisel dipped in oil.



FIG. 3 SHOWS ANOTHER WAY OF DOING THE JOB.

Iron or steel may be made rust-proof by boiling in a mixture made of one gallon of water to which is added four ounces of phosphoric

acid and one ounce of iron filings.

Where oil will not act as a cooling agent on a drill when working in hard metals, turpentine used instead will permit the drill to take hold and retain its temper.

Mark Meredith.

WRINKLES FOR FILE USERS.

Here are a few practical "wrinkles" for file users. A new file should always be used with a light pressure on the work until the needlelike points of the teeth are worn away; after this, a greater pressure may be used with much less danger of breaking off the teeth at their base. It often happens in the case of new files that half their wearing property is diminished by a few careless strokes when first applied to the work. A new file should not be used on the chilled and gritty skin of castings, or on a weld where borax or any vitreous flux has been employed. A worn file should first be used on



FIGURE 2 IS A RADIATOR SUPPORT MADE OF 1/8 INCH BAND IRON.

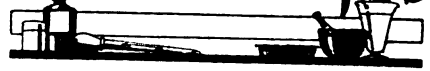
the rough, gritty or oxidised surface, and thus pave the way for more efficient work with a new sharp file. Again, in filing steel, better results can generally be obtained by using files of a grade not coarser than "second cut," finer grades being employed according to the finish or delicacy of the work under manipulation. Lastly, there is the reminder that the best results cannot be expected from a file if used on brass when it has been supplied for use on iron or steel.

Mark Meredith England.

ELIMINATING "TINNY" NOISE

A "tinny" noise is not uncommon with Fords. It is sometimes in them when they come from the factory. The trouble is in the roller bearing at the end of the drive shaft. This is sometimes loose and when the car is speeding the vibrations of the shaft, also the friction of the gears in the hind axle, cause this "tinny" noise which is conducted through the drive shaft housing and comes out from under the driver's seat. If the Ford owner will have the pinion that is at the end of the drive shaft also the roller that is back of it changed his trouble will surely stop and he will never hear the same noise again until the new roller is worn out.

Benton's Recipes



Cold Tinning Process For Use On Finished Work In Iron, Brass or Steel—To tin by cold process finished work in iron, brass or steel such as pins, tacks, wire goods, etc., put twenty pounds of stock well cleaned in sawdust, in a deep pan (14 x 20 x 3 inches is a good size) having a false bottom of zinc. Heat to the boiling point a mixture of 1/4 ounce of sulphuric acid and 2 ounces of tin crystals (stannous chloride) and pour over the work. Let it stand ten minutes and then stir well, using a rake, and then let it remain ten minutes longer. Repeat the process and if two coats are not enough, give it a third coat. The zinc bottom must be washed twice a day, as rusty or oily work will not tin satisfactorily.

To polish the work, put in a wooden tumbling barrel and pour in a water pail full of strong soap and water. Let it tumble fifteen or twenty minutes, according to the nature of the work, and then tumble for a few minutes in hot sawdust to dry it.

Steel Welding Compound—A good compound for welding cast steel is made as follows: 4 1/2 parts, boracic acid; 35 parts, common salt; 20 parts, ferrocyanide of potassium; 7 1/2 parts, resin; 4 parts, carbonate of sodium. Heat the pieces to be welded to a light red heat and apply above compound, then heat to a strong yellow heat and the welding may be accomplished in the usual manner. A. A.

(The usual precaution applies, of course, in the use of the above, the same as with any of the cyanides, and that is to avoid breathing the poisonous fumes.)

Mixtures for Casehardening—Good casehardening mixtures may be made from charcoal, with 2% soda ash added; 1 part prussiate of potash, 2 parts bone dust, and 2 parts sal-ammoniac; or 1 part of sal-ammoniac and 3 parts of prussiate of potash. Prussiate of potash may be used alone, the following method being observed: The article to be hardened is polished and heated to a bright-red heat, when it is rubbed over with prussiate of potash. When it has cooled off to a dullish-red heat, the article may be immersed in water to cool off.

The preparation of dubbing is a simple matter which it is well to be acquainted with. It is composed of 2 parts by weight of resin, 1 part of tallow, and 10 parts of machine oil. If a thicker mixture is desired, use only 8 parts of machine oil.

To Braze Cast Iron—Put broken parts together tight, then heat bright red, then sprinkle on cyanide of potassium which seems to turn the cast iron to steel, and get up a brazing heat and braze with spelter and flux as usual, and by sprinkling a little cyanide on with the spelter it will flow nicely, instead of forming little lumps all over the job.

To Solder Brass or Steel to Steel—To secure a permanent joint when soldering brass to steel or steel to steel, after polishing both surfaces, coat with your water, then apply the acid and apply the coppering solution (blue vitriol and solder. This mode of treating the surface to be soldered is particularly valuable when filling in metal patterns or adhering a small piece to a large one.

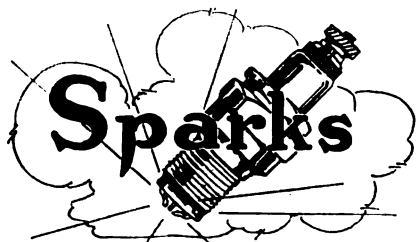
AN OLD POEM DRESSED UP.

Under the spreading chestnut tree,
the village smithy stands,
The smith, a mighty man is he, with
large and sinewy hands.
He owns a dozen village lots and
handsome country lands.

He owns a handsome private yacht
and proud seaside chateau;
He travels in a private car wherever
he may go;
His fortune now is reckoned at five
million plunks or more.

He doesn't shoe mules any more, or
mend the one-horse shay;
He makes more in a second now than
once he did all day;
He merely tinkers touring cars that
pass along his way.

—Exchange.



William Allen White says that he has an idea that an enterprising man who could go to Russia and establish a chain of free lunch counters could be elected czar without opposition.

This is the time of the year when Mr. Garfield could send along several assorted heatless days.

Secretary Baker says 700,000 of our boys have gone to the front. Help bring them back quickly by saving to the utmost of your ability and buying War Savings Stamps.

Remember that the soldiers' chance of life depends upon the support given him by the folks back home. Help! Save and buy War Savings Stamps.

"Kamerad" is defined as an appeal for mercy from those who deny it to defenseless women and children.

Silence is golden but money talks even in a quiet little game.

The smitten cheek doesn't always demonstrate that one good turn deserves another.

All the gas attacks are not at the front. Some of the military critics at home can shoot a lot of hot air into us.

The Germans are beginning to have more respect for Uncle Sam now. Of course they knew he carried a gun but they didn't know it was loaded.

It isn't the weight of care that makes a man stoop-shouldered. Many a fellow gets that way from carrying around his good opinion of himself.

Many of our poorer citizens are undergoing real sacrifices that they may be able to show their patriotism by buying War Savings Stamps.

Even the chickens have to scratch for a living—generally in the neighbors' war gardens.

Isn't it strange that the man who has a nose that looks like a three alarm fire always denies that he ever took a drink?

Any old time a man breaks his engagement to a girl because she isn't a member of his church, that isn't the real reason he doesn't want to marry her.

We know a man who once went to Canada on a two weeks' trip and ever

since he has been talking about "when I was abroad."

A woman has to be pretty old or pretty sick if she passes a mirror without looking into it.

Brides are getting harder to please all the time. There was a time when they would go into raptures over a ball-bearing washing machine, but nowadays they want a flivver.

Many an innocent child who fears the dark grows up and leads such a life that he fears the light.

A whole lot of sassy little men get by because a big man doesn't get any credit for hitting a little one.

We are there with bells on when it comes to pointing out the mistakes of others.

But we are to apt overlook our own.

Another good bet is that when a man begins telling his wrongs, he is sure to be unreliable.

Another fairy tale—We once addressed an old soldier as "Captain" and he got mad and told us that he wasn't a captain and never was.

War Savings Stamps are within the reach of everyone who conscientiously wants to save.

And Bluebeard's wives were not the only women who lost their heads over an ornery.

All's fair in love and war, so here's luck to the soldier boy who is lucky in love.

You never can tell. Even blue blood sometimes contains a streak of yellow.

If every man kept his own counsel what would the poor lawyers do for a living?

Even the fellow who puts his best foot forward won't get far without the other one to back it up.

If the men in our Army and Navy can do without luxuries we at home certainly can.

The man who doesn't amount to much is always the one who insists on letting you know it.

Better lay in your supply of rattle-snake venom now. The price is going to jump from \$5 to \$10 an ounce.

The idea of shipping bootleg whiskey into dry territory in coffins is a practice to be commended. The same men who

drink the whiskey can use the coffins, thus killing two birds with one stone.

Early rising is healthy or it is not, depending altogether on whether you're a worm or a bird.

Right now we are drinking beerless beer at a nicker a thimbleful and in a year or so there won't be any more whiskey. So we might as well tune up and get ready to sing: "Oh, prohibition, where is thy sting?"

Things to worry about—A cockroach has no kidneys.

Don't be too hard on the chap who happens to make a fool of himself. If you haven't made a fool of yourself yet you soon will.

When you agree with a man he has nothing left to argue about but when you agree with a woman she keeps right on arguing.

Some men's minds are so small they regard a nickel in much the same way an elephant regards a peanut.

We are not going to lose the war, but did you ever stop to think what would happen to us if we did lose it? The speed with which we win it depends upon the way you and I save and give the Government our financial support. Buy W.S.S. for a quick victory.

Why does a 200 pound teamster sit on one end of the wagon seat and force it out of plumb when he could just as well sit in the middle of it?

Here is another damli: "Once upon a time there was a man who knew more than he thought he knew."

A dentist is about the only man on earth who could kill the nerve of some people.

There is some class to a small boy. He despises a sofa pillow poodle as much as he loves a common cur who is just plain dog.

When a man spends \$10 on a raffle and wins something worth about a dollar, his friends never get done talking about what a lucky cuss he is.

A husband can have a face that looks like an old landmark and he can be so hard up that a dime looks like \$10. But he dassent come home after midnight without being accused of leading a double life.



PRACTICE SAFETY YOURSELF—OTHERS WILL FOLLOW YOU.

Speedometers and How to Care for Them

L. W. BURCHINAL

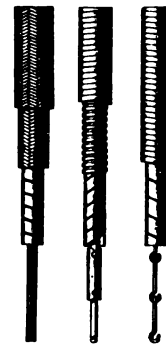
Among the accessories that are usually to be found on the modern automobile and which only give trouble on occasion the speedometer must be included. In spite of the delicate nature of this instrument it is not often that the repairman has occasion to attempt repairs on it.

However, when such an occasion does arise, some knowledge of the device is like a "flask"—a good

return the cup to zero when the car stops. Generally a temperature compensator is fitted in this type to prevent the hairspring being affected by changes in temperature.

Within the last year or so the air current type of speedometer has achieved some popularity. This instrument employs a stream of air to turn the dial which indicates the mileage. The air current is furnished by a small blower attached to the flexible shaft. Examples of this type are so uncommon that further description of this instrument at present will be passed. Another type that might be mentioned along with this type is the electric speedometer which registered the speed on a voltmeter on the dash marked to miles instead of volts. The current for this instrument is obtained from a very small dynamo driven by the flexible shaft. This type along with the hydraulic or fluid pressure speedometer in which either a liquid or a gas was acted upon by a suitable device to create a pressure proportional to the speed of the car are rare birds and will not be mentioned again in this article.

The most widely used style of speedometer aside from those of the magnetic type are the centrifugally operated instruments which are actuated on the same principle found in the fly-ball governor that is familiar on every steam engine. Weights are mounted on the moving shaft by means of levers or cranks in such a

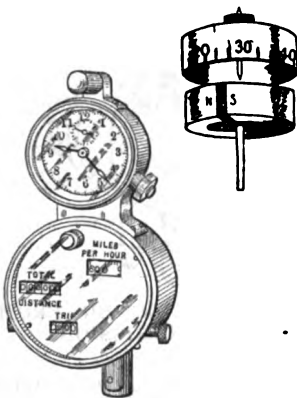


THREE DIFFERENT TYPES OF SPEEDOMETER CABLES THE ONE ON THE RIGHT BEING THE MOST COMMON.

manner that the movements of the weights by centrifugal force is communicated through the shaft to the dial. When the speed of the car increases these weights tend to fly out, and being connected with the dial through the shaft, pull the former around to the right and display the correct figures for the miles per hour.

All speedometers have certain characteristics in common; the variations in all generally refer to the means employed of actuating the mileage dial. All these instruments have a connection in the shape of a flexible, rotating shaft that is housed in a flexible tube and attached to some running part of the mechanism, usually one of the front wheels. On the end of this shaft is a gear, which meshes with a gear on the moving part employed. This shaft is driven from the car's mechanism and in turn it drives the mechanism of the speedometer through some sort of a joint. It has been in the past almost the universal custom to connect the speedometer with one of the front wheels, but recently the idea of using the propeller shaft for this purpose has come into marked favor. Now a number of car manufacturers are beginning to attach the speedometer with the transmission unit and claims of maximum quiet, perfect lubrication and perfect protection are made for this location.

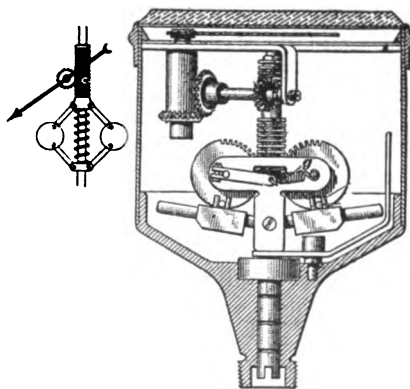
When something goes wrong in the internal construction of the speedometer the repairman can do nothing but take it to the nearest service station or return it to the manufacturer. He would stand just as much chance of repairing his watch as this instrument. However, there are other derangements that he can repair. For instance, the coup-



AN INSTRUMENT OF THE MAGNETIC TYPE AND THE PRINCIPLE OF OPERATION.

thing to have around the house in case of an emergency."

At the present time there are in use four definite types of speedometers; magnetic, centrifugal, hydraulic and that driven by an air current. The magnetic type of speedometer is probably the most popular type, as far as the number of makes of cars on which it is standard equipment. A typical construction in this class employs but one moving part, a circular magnet. Over this magnet, but not touching it, is an inverted metallic cup, on the rim of which is a row of figures which indicates the speed in miles per hour. The magnet is revolved by means of a flexible shaft, its field acting on the dial cup just mentioned. As the speed of the magnet increases, so does the magnetic pull and the dial cup is drawn around to indicate the increasing speed. The dial is mounted on a steel shaft with a jeweled bearing at the top. A hairspring is fitted to resist the pull of the magnet and this also serves to



SPEEDOMETER OF THE CENTRIFUGAL TYPE AND ITS PRINCIPLE OF OPERATION.

ling at the bottom of the speedometer "head," as the instrument on the dash is generally called, sometimes shakes loose so while the shaft still revolves, the dial does not register anything. To fix this, the end of the shaft should be loosened from the head, pushed firmly in place and tightened again.



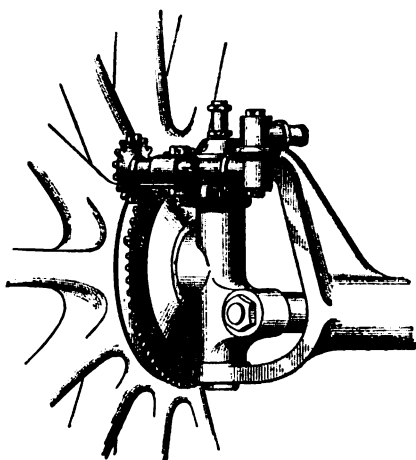
UPPER—SLIDING
BAR AND LOWER
END OF DRIVE
SHAFT

LOWER — UPPER
END CLUTCH OF
SPEEDOMETER
DRIVE SHAFT

Again the flexible shaft may bind in the housing, due to abrupt bends and then the speedometer will fail to register. When trouble occurs, look first at the shaft and see that it has as few bends in it as possible and those long and sweeping.

Another thing to watch is in making the change from one size tire to another on the wheel that drives the speedometer, this will make the readings inaccurate. Even a change to oversize tires will cause inaccuracy. The gear that drives the speedometer should have twice the number of teeth that there are inches in the diameter of the tire, for instance if the change is made from a 34 x 4 tire to one 35 by 4½ the 68 toothed gear that would do for the smaller tire will give inaccurate speed. For teeth should be used.

It sometimes happens that where the driving gears are of fibre that a noise is caused by loosening of the parts. By using a little strong laundry soap the gears may be swollen again, so that they will mesh better. It is a good thing to give the moving parts a little oil from time to time but where the gears run exposed this will not be very effective.



THE USUAL METHOD OF ATTACHING
THE SPEEDOMETER SPROCKETS
AND SWIVEL JOINT TO THE
FRONT WHEEL.

WHAT TO DO AND WHAT NOT TO DO

The proper road wheel gear must have twice the number of teeth that there are inches in the diameter of the wheel.

Fibre pinion must have 16 teeth (there are a few exceptions).

Make sure that the clutch in the flexible shaft enters the slot in the neck of the speedometer, and the same is true of the other end at the swivel joint.

NEVER attempt to lubricate the speedometer head. Do not under any circumstances open the speedometer to attempt repairs.

Avoid having sharp angles in the flexible drive shaft. A broken chain usually indicates jamming, or crowding due to sharp bends in the shaft.

To lubricate the chain remove from the casing and with a small quantity of graphite grease placed on a cloth and held firmly in the hand, draw the chain through the lubricant so that the links are filled. Do not use fluid oils or hard grease. Vaseline will be O. K.

Remember that the swivel joints are made to operate from the right and left hand wheels. A right hand swivel joint cannot be used on a left hand wheel.

The season odometer can only be re-set to zero by returning the instrument to the factory or the nearest service station.

Do not order speedometer glasses, bezels, or any interior parts of the speedometer head. When such repairs are necessary send the instrument to the factory or the nearest branch of the maker of the instrument.

In some cases after the speedometer has been in service for some time, the dial begins to fluctuate, a condition generally caused by vibration. In some cases this may become a chronic condition, but again it may be simply due to looseness in the fastenings and the connections which can be fastened in a jiffy. If the instrument suddenly fails to register mileage and speed, the first thing to examine is the drive shaft. Disconnect the shaft at the head and with the front wheel being turned see if the shaft revolves without jerking. If the shaft runs smoothly the trouble lies in the instrument itself. It happens sometimes that a link in the shaft is broken, so that when the part is disconnected in this way the broken ends will catch at intervals. While the shaft is disconnected turn it in the head and see if it makes the dial register.

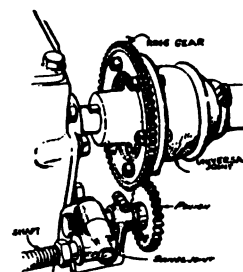
The first New York show was held in 1900.

In 1898 gasoline sold for six cents a gallon.

S. A. E. THREADS

There is considerable confusion in the minds of some repairmen what the S. A. E. or, as it was formerly known, the A. L. A. M. thread, is and what the difference is between it and other threads.

There are three threads that are in common use, the V thread, the United States Standard or U. S. S. and S. A. E. Formerly the S. A. E. thread was known as the A. L. A. M. thread from the Association of Licensed Automobile Manufacturers who did business by virtue of a license under the famous Selden "patents" until Henry Ford came along in his flivver and knocked Selden, his patents and his patent licenses into a "cocked hat," consequently since that time not much has been heard from Selden or the A. L. A. M. as an organization. The



SPEEDOMETER DRIVEN FROM THE
TRANSMISSION

S. A. E. is merely an abbreviation of the Society of Automobile Engineers which is the arbiter of all things tending toward standardization of things mechanical in the automobile business.

For one reason and another it was found that neither the V or the U. S. S. thread were desirable, in other words, could not stand up, and so the S. A. E. thread was evolved. The S. A. E. thread is the same in form as the U. S. S. thread only it has a much finer pitch than either the V. or U. S. S. and for comparison the following sizes are selected:

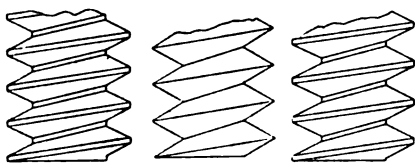
Diam. of Screw, In.	V stand.	Threads per Inch	
		U.S.S.	S.A.E.
¼	.....20	20	28
⅜	.....16	16	24
½	.....12	13	20
¾	.....10	10	16
1	.....8	8	14
1½	.....6	6	12

In sizes over 1½ inches the S. A. E. provides for both a fine and a coarse thread, but even the coarse thread is considerably finer than the other standards. The sizes for 1½ and over are but rarely if ever used except for hub caps, axle tubes, etc.

Generally speaking the U. S. S. thread is one quarter stronger than the V thread and the S. A. E. is one-

half stronger than the U. S. S. (for some purposes).

In the U. S. S. and V. systems the nuts and the heads of bolts are slightly different in size which requires wrenches of different sizes for them. In the S. A. E. system both are the same size. The S. A. E. re-



S.A.E. Thread V. Standard U.S. Standard

THE S. A. E. THREAD IS THE SAME AS THE U. S. S. ONLY THE FORMER HAS A CONSIDERABLY FINER PITCH

quires that all "castle" nuts be case hardened but generally speaking, they aren't.

An advantage of the S. A. E. thread is that it will work loose slower than the others and with the additional number of threads the nuts can be lined up with the cotter pin holes in the bolts without so much danger of stripping.

The S. A. E. thread is unsuitable for use in brass bronze or aluminum and this explains why studs holding the cast iron cylinders to the aluminum crank cases in some instances have the S. A. E. thread on one end and the U. S. S. on the other.

While the S. A. E. thread has come into almost general use for automobile parts it is still far from being all that is desired even for this purpose.

COVERING 315 MILES IN REVERSE GEAR WITH 9 IN MACHINE.

World's champion in every line of endeavor have come and gone and their records have been surpassed by those who follow, but it is possible that the record made by Mr. Abraham Toube, formerly of Portland, Me., but now of Los Angeles, California, will stand for many a day and probably for many a year. This motorist's performance consists of covering the distance between Needles, Arizona, and Los Angeles, a mere trifle of 315 miles, in reverse gear—in other words, with the rear end of the machine taking the lead and the radiator serving as a rudder. The distance was covered at a maximum speed of eight miles an hour and to complete the stunt took nine days.

But that was not all. This reverse gear record was made with 8 persons, in addition to the driver, in

the machine. The whole thing happened in this way: A few days before last Christmas Mr. Toube and family, there being seven little Toubes in the outfit, started from their home in Portland, Me., with the "land of flowers" as their destination. They journeyed by way of Boston, New York, Washington, D. C. St. Louis, Kansas City, etc., striking at the earliest possible moment the National Old Trails Route, which leads directly into Los Angeles.

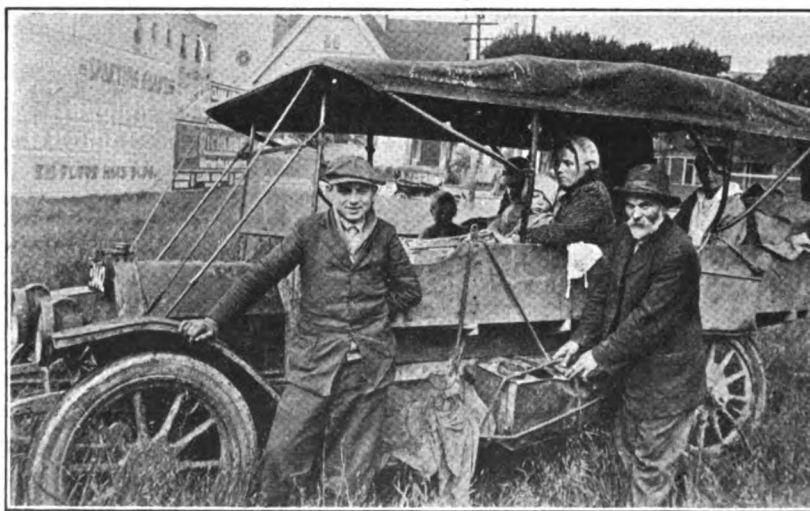
Needless to say, during the trip across country all conditions of weather and roads encountered, but no matter how deep the mud, or how cold the weather the Toube family did not become discouraged. The "old boat" plugged right along and managed to keep "rudder last" until the party got a short distance east of Needles. At that point the trail was lost and it was while trying to regain it that the Parker cut-off was encountered. It was during an attempt to cross a rocky stream bed that the fireworks began—this consisting of stripping all three of the forward gears. This happened when the car was in the center of the stream, and when it was found that the forward gears would not "take hold" the auto was backed out of the stream, turned around, and while in the reverse gear was backed across the creek and on into Needles. On account of financial troubles it was impossible for the stripped gears to be replaced, so the pilot decided to make the remainder of the trip in reverse.

The machine in which this family of nine traveled and camped, is equipped with many features that would tend to add to the comfort

of the travelers. Except where impossible on account of the weather, the father and eldest son slept on the ground on cots, while the interior of the machine, which was generally enclosed at night by the side curtains, was used by Mrs. Toube and the younger children for sleeping purposes. The reason for the Toube family taking this trip was the ill health of Mrs. Toube, who has become very much stronger since starting this "jaunt." The children, who range from a babe in arms to the eldest boy—15 years old—are pictures of health, which condition is attributed, mainly, to the overland journey.

Shortly after rolling into Los Angeles, Mr. Toube, speaking of the trip, said: "We had just \$300 when we left home and the money lasted us, with strict economy, until we reached Needles. Had we not lost our way and tried to negotiate that rocky stream bed we doubtless would have been able to make Los Angeles on the original \$300. Our misfortune made it necessary for me to seek work in Needles to get sufficient funds to continue the journey. As might be expected, we encountered all sorts of weather, including rainstorms, snowstorms, blizzards, sleet, mud, etc., but notwithstanding all these we were making it fine until the big mishap occurred.

While the party has had enough of touring for awhile, they claim that they will "do the same thing over," some day. Although this reverse gear record was brought about by misfortune, the fact remains that the 315 miles of all kinds of roads, were actually covered in this manner.



WE KNOW A MAN WHO CAN'T BACK HIS CAR OUT OF THE GARAGE WITHOUT THE NEIGHBORS CALLING THEIR CHILDREN INTO THE HOUSE, BUT HERE'S A MAN WHO RAN HIS CAR BACKWARD FOR 315 MILES.

WHEN CHECKS AND NOTES ARE LOST OR STOLEN

RALPH H. BUTZ.

A large number of business men are of the opinion that if checks, notes or other negotiable instruments are lost or stolen from them that they can protect themselves against loss by merely stopping payment on the particular papers that have disappeared from their possession. That this is the prevailing opinion is evidenced by the fact that in almost every case where negotiable papers disappear the owner promptly notifies the bank to stop payment, but does not take any further steps to prevent the loss of his money. Furthermore, the courts are quite frequently called upon to determine whether the drawer or holder, of negotiable instruments that have been lost, must bear the loss. Every business man should know what his liability is in such cases.

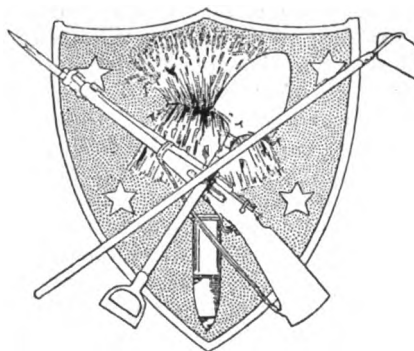
Stopping payment of an endorsed check, note or coupon to bearer, does not protect the drawer, or the original holder, when the check, note or coupon, has reached the hands of a bona fide holder, even when it has passed through the hands of a fraudulent holder. This is of particular interest at the present time, when so many people are holding Liberty Bonds. In many instances the holders of such bonds are not taking the proper precautions to preserve them against theft or loss. If a coupon bond is stolen and passes into the hands of an innocent party for value, then the loser of the bond must bear the loss. Of course, this does not apply to registered bonds which are not so easily transferred.

A fraudulent holder of a negotiable instrument, whether check, note or coupon, can give to a bona fide holder for value a better title than he himself possesses. This is one of the exceptions to the rule that no one can convey to another a superior title to personal property than he himself holds.

For example, let us assume that a business man, having a bank account and a balance at his bank, writes a check payable to order for an amount within that of the balance to his credit. He can, in case the check is lost or stolen, stop payment to the person to whom he has made the check payable and who has endorsed it, and to all other holders. But in most states, the bank upon which the check is drawn can not be sued, as such

suit is prohibited by statute. The drawer, however, can be sued by any holder who has obtained possession of it by giving something for it—money, goods or services—even if he received it from some one who found it or stole it, after it had been endorsed. And to a suit against a holder for value there is no defence.

This is not law made by the legislature of any state, but is the common law which originated in England through the customs of business men, in exactly the same manner as all law originated in custom. The only way by which the law on the subject could be changed in any state would be by direct action of the legislature. There is, however, neither need nor demand for such change. The legitimate holder of a check, note or coupon, is not entitled to protection, nor is such holder of any other



U. S. COAT OF ARMS MODEL OF 1918.

negotiable instrument, when guilty of negligence. Upon the other hand, a holder for value of any negotiable instrument is on all grounds of equity entitled to be paid when in the ordinary course of business he has come into possession of any paper of the character named.

In refusing payment on a check or note it is no defense to say that the negotiable instrument was not actually delivered to the payee. If in any manner the completed instrument passes out of the possession of the signer into that of the payee or bearer, the instrument imposes a legal obligation on the maker or drawer, if it passes into the hands of a bona fide holder for value.

The case of Shipley v. Carroll will illustrate the point mentioned. Carroll wrote and signed a note in the presence of the payee, but with no intention of delivering it to him. In some manner the payee obtained possession of the note and sold it

to Shipley, who had no knowledge that the note had been stolen from Carroll. The court held that the note was an obligation of Carroll, and that Shipley, who bought the note innocently, was guilty of no wrong, or breach of duty, or injustice in enforcing it.

In another and similar case, where a note was stolen and transferred to an innocent holder, the Court held that: "Negotiable paper differs from ordinary written contracts in this respect, that even a wrongful holder, between whom and the maker or indorser the note or indorsement would not be valid, may yet transfer to an innocent party, who takes it in good faith, without notice, and for value, a good title as against the maker or indorser. When a note payable to bearer has been lost or stolen from the owner, and has subsequently come to the hands of a bona fide holder for value, the latter may recover against the maker and all indorsers on the paper when in the hands of the loser; and the loser must sustain the loss. When one of two innocent persons must suffer by the acts of the third, he who has enabled such third person to occasion the loss must sustain it."

These cases show very clearly what care must be taken in issuing and handling negotiable instruments. As the Court plainly stated, the party through whose negligence the loss or theft of the note occurred was responsible for the amount so lost. Thus, if a man leaves negotiable papers at a place where they may be lost or stolen, he is the party who must bear the loss if they are subsequently transferred to bona fide holders for value.

(Copyright Ralph H Butz.)

VALVE TAPPET ADJUSTMENTS.

There occasionally develops in an engine normally quiet in operation a tapping or knocking, which is due to maladjustment of one or two of the valve tappets. For quiet operation of the tappets there must not be severe impact between tappet and valve stem. If the tappet is moving fast before it commences to lift the valve, the impact will be severe and there will be noise. The tappet should be adjusted so as very nearly to touch the valve stem. When the engine is hot at the end of a run, the proper time to make adjustments, the tappet should be adjusted so that it just touches the valve stem. The valve being hot will not expand any more and when the tappet is adjusted in this way very good results will be obtained.

The Motor Car Paint Shop---VII.



The painter of today is compelled to figure on the time element more than ever before. He is impressed with the fact that every day unnecessarily consumed in the painting of an automobile is a day lost in the delivery of the job and must be figured as positive loss to the paint-shop.

So it is that, in endeavoring to find some means of hurrying his work along, he naturally turns to the baking-oven. A discussion of the baking-oven proposition will be found in the chapter on Equipment. A few paragraphs here seem necessary on the proper material for use with baking systems.

All of the materials called for in the systems explained in the foregoing articles are specially made for work of this sort, and lend themselves in every way to aid the painter in oven-drying or baking his work.

In general, it is safest to bake all coats at a temperature not exceeding 150° Fahrenheit.

Five to eight hours at this temperature will thoroughly dry and bake any one of the coats while many of the surfacer, groundwork and priming-coats may be baked in less time—three hours often sufficing.

Higher temperatures than these are not safe in general work.

COLORS: HOW TO MIX THEM

For general Work:

Beat the color thoroughly with a small wooden paddle and add turpentine and pure raw linseed

oil as follows: Add the turpentine gradually (stirring continually to avoid lumps), until the mixture is thin enough to be easily laid on, then to a pint of the thinned color add a few drops of oil. Be sure to beat the color adequately, otherwise the turpentine will not properly reduce it and it will be lumpy or grainy.

For Quick Color:

Beat the color thoroughly with a small wooden paddle and dilute with pure turpentine only, adding the turpentine gradually until the color is thin enough to be easily applied with a camel's-hair brush.

Any of the standard colors may be made into varnish-color by first thinning with turpentine and then adding sufficient varnish to produce a decided gloss. This gloss should invariably be flatted before the job is finished. Under no circumstances should both oil and varnish be put into the same cup of color; this precaution being necessary as the most important means of preventing "deviltries" which vex the painter. In all cases let the varnish predominate. In all mixtures of varnish and color add the varnish freely, with as little of the color as is actually required for the work to be done.

The importance of not taking from the open can of paint more material than is just amply sufficient to complete the job in hand cannot be exaggerated.

Varnish should not be added as a binder to a cup of color. When the painter is disposed to add anything but turpentine, let it be a few

drops of raw oil to the pint-cup of thinned color. This cannot do harm and generally may be said to do good, and the color will present the same dead-flat surface to the coat of rubbing-varnish, thus insuring the adhesion of the latter to the color coat.

On the other hand, a binder of varnish will unite with the japan and form a close surface repellent to the varnish. The one good, safe, conservative rule of first thinning the black or color with turpentine and then adding a few drops of raw oil never was known to make trouble for the painter during the process of his job, or to chip or scale when the job has been put to the wear of active use.

A job not presenting a dead flat-color surface should be well rubbed over with a soft sponge and cold water and then varnished when thoroughly dry.

It is a well-known fact, conceded by all painters of experience and very easily demonstrated, that a coat of color in varnish gives a much more brilliant and richer effect than the same color painted flat under clear-rubbing. This is universally true of most colors and especially so of composites, such as dark greens and the developed lake pigments.

The beauty of undertone that these colors possess cannot be shown to advantage in flat-color under varnish, owing to the fact that japan dries throughout dull and lusterless, whereas all pigments should be suspended in a highly transparent and brilliant vehicle so that the varying lights from undertone and top-color may be reflected clearly upon the eye.

Even whites, light grays and blacks which cannot be said to possess undertones show to much



FLEET OF OVER 200 MACK WAR TRUCKS IN BATTLE ARRAY, LINED UP FOR INSPECTION BEFORE SHIPMENT TO FRANCE. THESE TRUCKS AND THOUSANDS OF OTHERS WILL BE USED BY THE U. S. ENGINEERS IN THE GREATEST CONTRACTING JOB ON EARTH.

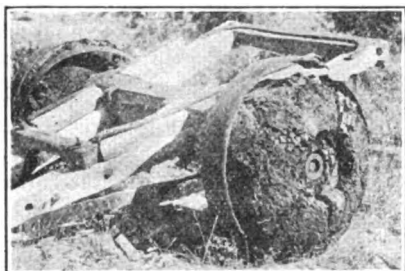
better advantage when brought up in solid covering color-varnish, for the reason that the yellowish cast produced by the application of two or more coats of clear-rubbing over these colors in the flat makes creams of the whites, greens of the blacks, and throws the grays off shade to an alarming degree.

However, the working properties of color varnishes made in other shades were never of the best, and even the long-oil free-flowing color-varnish that was put on the market some years ago fell into disfavor when the careful painter discovered that it could not be rubbed properly owing to its extremely elastic nature.

The prerequisites of a true color varnish are three: It must be dry to rub in from twenty-four to thirty-six hours.

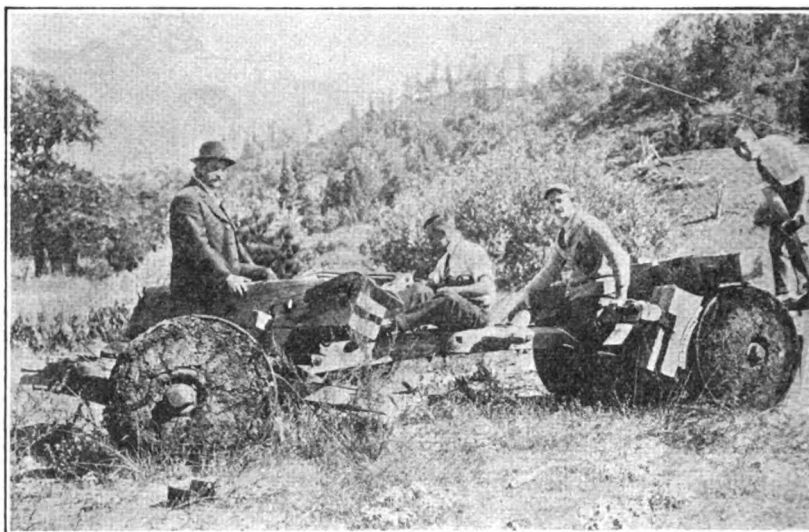
NOVEL WAGONS USED FOR LUMBER HAULING

Years and years ago, before the United States government put a stop to the cutting of timber in the great San Bernardino mountains of California, private corporations



THE RAVAGES OF TIME IN CALIFORNIA ARE NO KINDER THAN ANYWHERE ELSE, ALTHOUGH YOUR TRUE CALIFORNIAN WON'T ADMIT IT.

hailed thousands and thousands of feet of timber out of that section annually. While these mountains are among the most beautiful imaginable, the work of bringing this timber to civilization, because of the inaccessibility of the country, very often meant great hardships for the workmen. The first vehicles used in bringing the timber in from the wilds were "home made," wooden-wheeled wagons, one of which is shown in the accompanying illustrations. These wagons were so made that they could be adjusted in length, according to the requirements in the carrying of the different timbers, and they were made standard tread.



PONDEROUS WAGONS SUCH AS THIS HAULED MILLIONS OF FEET OF LUMBER OUT OF THE GREAT CALIFORNIA FORESTS.

The wheels of these vehicles were possibly their 'most peculiar feature. They were made of wood and were solid, except for a hole in the center, through which the axle ran. These wheels ranged in thickness from one foot to eighteen inches, and before being used each was fitted with a steel tire about an inch thick. For this lumber transportation work a vast army of these wagons were employed, but notwithstanding this fact the vehicle here shown is the only one now in existence, so far as is known. Its present location is a flat or meadow situated something like 7000 feet above sea level. Were it not for its frail condition it would be moved from the mountain top and placed in some museum, but it is believed that if an attempt along this line were made "the old boat" would fall to pieces.

In their day these wagons gave good and faithful service, but there came a time when they proved too slow and it was then that they gave way, so far as the main hauling out of the valley was concerned, to the steel rail, but even after the railroad was completed and in operation these wagons were used to haul the timber from the various sections to the main line. Many of the steel rails were hauled over mile after mile of mountain "highway" by these novel wagons. The ties for the railroad were cut right on the ground and the road, which was about forty miles in length, was built along an advantageous route on the mountainside.

The railroad was used for a long time, but there came a time when

the government decided to put a stop to the cutting of timber in the San Bernardino mountains forever, and it was then that the whole business—wagons, railroad and all ceased operation for all time. These mountains are now the most important fish and game preserve in the southern part of the Golden State.

A LETTER.

"It was very interesting riding through Iowa to see the automobile shops in small towns we passed

"A couple of the signs I noticed read as follows:

Blacksmith, Garage and Woodwork
Ford Authorized Sales and Service.

"This was a good looking, substantial shop with about fifteen cars standing out in front of it, had a curb pump for selling gasoline and was pretty busy as far as I could see from the train.

"Another one bore the following sign:—

General Blacksmithing and Automobile Repairing Accessories Sold and Installed.

"This shop was a new concrete building, looked prosperous had numerous cars standing around and was located in a town of about 500 people, I should say.

"In talking to Mr. Cooper, we were discussing the country shop. He told me that for repairs he could drive out to a small town about ten miles from his city and have repairs taken care of quicker, better and cheaper by a former blacksmith than by the garages in his own town."

The above is from a letter that was sent us recently by one of our advertising representatives during a trip through Iowa. It shows pretty clearly how the blacksmiths are taking to the auto repair business and with what success.

The Spring of the Car* II.

F. M. PAULL

THE first vehicles were undoubtedly two-wheeled affairs, like the Roman chariot, the ox cart and so forth. These vehicles were rigid and for that reason alone it would have been impossible to use more than two wheels and not have them rack themselves to pieces. Early attempts were therefore made to divorce the movement of the body from the movement of the running gear, by suspending the body with leather thongs like a swing.

Springs were first introduced about the middle of the 18th century, when they were used on pleasure vehicles and it was at this time that the trade of the spring maker was first developed. In 1804 Obadiah Elliot, a noted English carriage builder, obtained a patent on an elliptic spring suspension for vehicles, which type was a crude forerunner of present day automobile springs.

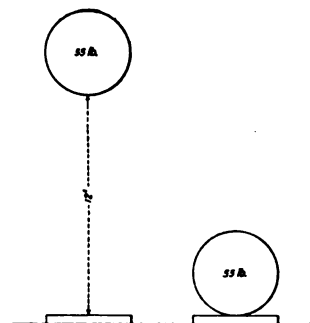


FIG. 1.

Old spring makers worked instinctively and from experience, and therefore their product varied considerably with the individual and also with his moods. The making of modern springs is an exact science. It is based upon recent developments in the mechanics of springs and in the metallurgy of steel. Indeed, these developments are still going on and although they have already revolutionized the art, there is still much more to come. Knowledge of spring design and manufacture are, however, not all that is necessary to successful spring building. It is just as necessary to know the exact conditions the spring is to meet and the

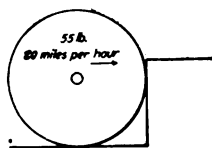


FIG. 2

forces it has to withstand.

Few people realize the magnitude of the forces that may be called into play by ordinary operation of a motor car at moderately high speed. At the present time we have no means of exact calculations, and recent experiments show that even the methods of approximate calculation in general use are very much in error. However, if we are to appreciate the extreme severity of the requirements of a motor car spring, we must gain at least a rough notion of the forces with which it has to deal.

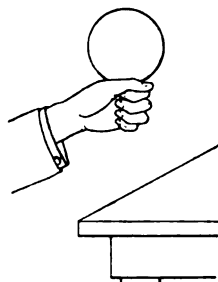


FIG. 3

Can you imagine what would happen if it were attempted to run a solid steel-tired, springless automobile over an ordinary good road at the moderate speed of twenty miles an hour? It certainly is not pleasant to think of riding in such a vehicle and anyone who has tried to ride in one of the old fashioned high-wheeled trotting sulkies over such a road, at a gait of only five or six miles an hour, can at least appreciate to a degree the severity of the impact shocks that are received.

Even if it were possible for a human being to ride and yet live in such a springless machine, it is doubtful if a car could be built strong enough to perform a feat of this kind without literally hammering itself to pieces.

Some impact experiments were recently conducted that bid fair to revolutionize the study of this subject. An apparatus was constructed that permitted the measurement of the maximum instantaneous force produced by a blow or shock and some of the results will show us well here as a quantitative example. Referring to Figure 1, a steel ball weighing about 55 pounds, was allowed to

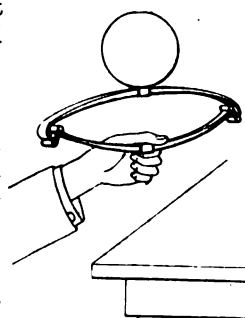


FIG. 4

fall 12 feet and strike against another steel object in such a way that the maximum force of the blow was accurately measured. The actual experiment showed that this 55-pound weight falling 12 feet exerted a

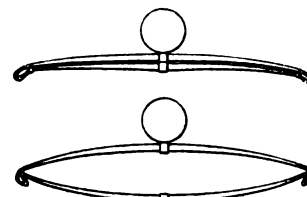


FIG. 5

maximum force of 9,500 pounds and that this value was reached .00052 seconds after the moment of contact.

In other words a wheel weighing 55 pounds and traveling at a speed of about 20 miles an hour, colliding with a solid object as shown in Figure 2 would experience a shock equal to the instantaneous application of nearly 10,000 pounds. Our usual methods of calculation would have led us to estimate this force at about one-half its actual value.

Thus we see that springs are not only necessary for the comfort of the

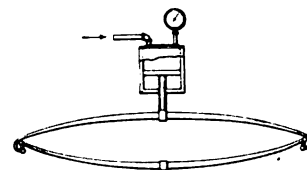


FIG. 6

passengers, but they are also absolutely essential for their safety. They must receive and harmlessly absorb all shocks arising from contact with the road and from sudden changes of direction. They are the "glad hand" and the "fixer" for the automobile and by proper exercise of the happy faculty of give-and-take they protect the car and its occupants from the worst dangers and discomforts of travel on the road.

To get a clear but qualitative idea of how the spring acts in absorbing harmlessly the energy of shocks, let us use the following illustration: If you should take a 10-pound ball in your hand, as shown in Figure 3, and strike the table, it would prob-

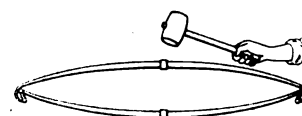


FIG. 7

ably crush your hand. Now if you should take another ball and interpose a suitable spring between your

NOTE—The writer desires to acknowledge the valuable assistance of the Detroit Steel Products Co. in the preparation of this series of articles.

hand and the ball—the combined weight of the two being 10 pounds and again strike the table, your hand would be saved from injury. The actual force of the blow received by the hand depends upon the deflection or flexibility of the spring. If it is too flexible, the spring will close up completely and allow the ball to strike a dead blow, as in Figure 5. On the other hand, if the spring were not at all flexible but perfectly solid its effect would be nil. Therefore, the greater the deflection without complete collapse, the less will be the force of the blow sustained by the hands.

The deflection corresponding to a given force is not always the same for the same spring, but depends up-

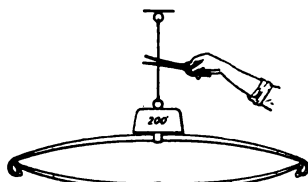


FIG. 8

acts and the *speed* of its application. Referring to Figure 6, a spring is being compressed by a piston driven by water pressure. If a compression of a half-inch corresponds to a force of 100 pounds, then 200 pounds of water force acting on the piston will compress the spring one inch. If the same spring were hit a blow with a hammer that would exert a force of 200 pounds, the hammer would rebound instantly without producing any appreciable deflection. In this case, the spring behaves practically the same as a rigid body because it *has not time to act*.

Two more interesting examples are shown in Figures 8 and 9. In Figure 8 we have suspended a 200-

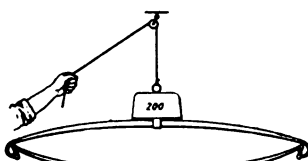


FIG. 9.

pound weight above the spring and we lower it slowly until the spring no longer deflects, when we find that the deflection is just one inch. In Figure 9 we have suspended the same weight just high enough to have it in contact with the spring, but not enough to produce any deflection whatever. When everything is at rest we snip the string allowing the weight to be suddenly applied to the

spring. This time the deflection is much greater than before; in fact the first drop is practically 2 inches, from which position it rebounds above its normal position and continues to oscillate with decreasing deflection until it finally comes to rest at one inch, the same as in Figure 8.

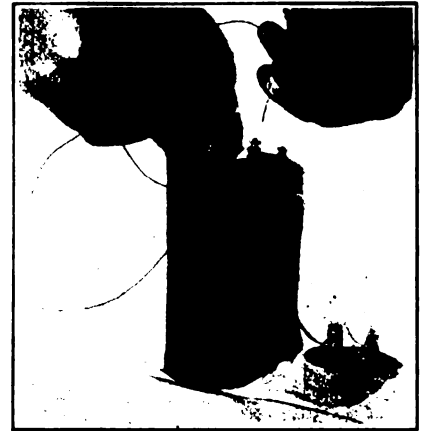
From the foregoing examples we see that the riding qualities and also the effectiveness of a motor car spring system depend upon the *speed* at which the car is operated. Running a heavy truck at top speed down a hill or some other suitable place often reveals this effect in a startling manner. Under these conditions, unless the springs are exceptionally well designed, the truck is apt to ride almost as though the springs had been entirely removed, every little jolt being felt all through the car, the actual effect is similar to stiffening the springs and in this way their usefulness may be so impaired that they furnish inadequate protection for the safety of the car, which will receive shocks it was never intended to sustain.

A CHEAP BATTERY TESTER.

It is probable that many of the readers of this article have, on account of a set of run-down dry cells been deprived of light from their automobile electric lighting system, or of the "battery" spark, just when it was most needed. "I didn't think the batteries were so low," the motorist generally says, "About the next thing I do is to buy an ammeter." However, that resolve does not help him out of the existing difficulty, the result being that he will either have to be towed home, or that he will have to walk to the nearest garage to buy some new batteries. To eliminate the possibility of the recurrence of this predicament, or even its occurring for the first time, the thing for the motorist to do is to carry some sort of a battery tester. As a rule the ordinary motorist feels that he can hardly afford to pay the price asked for a good and reliable ammeter, and for this reason the following inexpensive suggestion may be of value.

This consists of using a tiny incandescent light to show the amount of electrical current, if any, that is in a battery, and, incidentally, the result obtained is always correct. An ordinary Christmas tree electric light socket forms the basis of this novel current gauge. The other parts of the device con-

sist of a pair of wires which come fastened, one to the negative and one to the positive pole of the socket, and a tiny incandescent globe, suitable for use in this socket, To



TESTING DRY CELLS WITH OUT INSTRUMENTS BY USING A SMALL LIGHT BULB.

test the battery the opposite ends of the wires of the sockets are placed, one against each of the poles of the battery. The moment the circuit is completed the light flashes, the power of the flash showing the operator just how near the battery is to being run down, while the "dead" cell will, naturally, make no light. For convenience the pin in the back of the socket may be buried in a base of wood. Where the average good-quality ammeter costs several dollars, this unique and practical device costs but twenty-five cents. The globe, when burned out, may be replaced for ten cents.

VALVE GRINDING

In cases where a badly pitted valve requires regrinding, here is a shortcut. Cut a piece of emery cloth in dimensions a little bit wider than the valve seating and twice as long and then double it over so that both surfaces are cutting surfaces. Next cut a hole in the cloth so that the valve stem may be passed through and the emery cloth brought close up against the valve head. The valve is then placed in position for grinding under comparatively high pressure. Both sides of the emery cloth will conform to the valve head and the seating and if the valve turns and the emery cloth remains stationary, the valve will be ground on the upper emery, whereas if the cloth revolves, the valve seating will be ground on the lower emery.

THE ARMY HORSESHOER

Diseases of the Foot—Causes, Symptoms, Treatment—Pathological Shoeing—The Making of Pathological Shoes.

Information in this chapter is for the guidance of the Army horse-shoer in his capacity as an assistant to his regimental veterinarian. No treatment herein prescribed should be attempted except when directed by the veterinarian or organization commander.

Pathological shoeing is shoeing for the relief of diseased feet. The bar shoe is most commonly used because it produces frog pressure, which increases blood circulation and thus assists nature's method of building up diseased tissue. Removing pressure means trimming the bearing surface of the foot in such a way that the shoe can not cause pressure upon diseased parts.

CORNS.

A corn is the result of bruising the sensitive sole or sensitive laminae of the quarters or bars, and appears as a reddish spot in the angle formed by the wall and the bar, usually on the inside of the front feet, seldom if ever in the hind feet.

Causes.—A rapid gait on hard roads; lowering one quarter more than the other; shoes so fitted that they press on the sole at the heel, and shoes left on so long that the wall overgrows the heels of the shoe and causes the shoe to press on the sole; long feet, which remove the frog too far from the ground, thus preventing the proper expansion of the foot.

Treatment.—Remove the shoe and correct any faults that may have existed in the preparation of the foot. If no pus or heat is apparent, carefully cut away the discolored part until live, healthy horn is reached.

If the corn is a suppurating one—that is, one in which pus has formed—the shoe must be left off, the loose horn removed and the foot placed in a hot flax-seed poultice for several days. The poultice is changed when it becomes cold, and the parts are washed out with a solution of creoline—Creoline 1 part and water 25 parts. When all suppuration has stopped, plug the corn with oakum and tar, and replace shoe, exercising special care in the fitting of the diseased quarter to avoid pressure. A bar shoe should be used when the corn is accompanied by contracted heels, except in cases where the lateral cartilages are diseased. The bar

shoe is also useful in retaining large plugs.

The three quarter shoe may also be used for the purpose of avoiding pressure over the diseased parts.

Thrush.—Thrush is a diseased condition of the frog, characterized by a dark colored discharge which has an offensive odor. Causes—uncleanliness; horse standing in stalls saturated with urine, or in wet earth filled with decomposing vegetable matter.

Symptoms.—At first there is simply an increased moisture in the cleft of the frog, accompanied by an offensive smell. After a time the discharge is more profuse, then watery and highly offensive, changing gradually to a thick, putrid



matter which rapidly destroys the horn of the frog.

Treatment.—Remove the cause; keep the stalls clean and dry. Pare away all loose portions of the horn, so as to expose the diseased parts; clean thoroughly by washing with warm water; dry with oakum and pack with powdered alum, calomel, or copper sulphate; if the dressing will not remain in place use a leather boot.

Canker.—Canker is a disease of the frog and sole, marked by an offensive smelling, cheesy discharge, by a softening and breaking down of the horny frog and sole and by a spongy enlargement of the sensitive frog and sole. When this disease follows an injury which has exposed the soft structures of the foot, it soon causes a separation of the soft and horny

portions, presenting a very unhealthy appearance and discharging a thin, watery fluid.

Causes.—Canker is generally to be caused by a vegetable parasite, the development of which is assisted by filthy stables or low wet ground.

Treatment.—That part of the frog or sole that has been under run must be removed with the knife, and the canker exposed; the unhealthy growth is then touched with a red-hot iron, burning it off level with the surrounding healthy structures, care being exercised not to injure the sensitive portions of the foot. Next, wash clean, then dry, and apply the following powder: Equal parts of sulphate of zinc, sulphate of iron, and sulphate of copper. Place over this a pad of oakum, and over all a leather boot. This dressing must be changed once a day—twice a day in bad cases; treatment is continued until a healthy growth of horn covers the whole foot. The horse can now be shod. Pack the foot with oakum and tar, and cover with a leather sole, which is held in place by the shoe.

If it is desirable to change dressings on the shod foot, a more convenient appliance to keep them in place is made in the following manner: Cut a piece of sheet zinc to cover about two-thirds of the sole and frog, the outer edge of the piece fitting under the shoe; cut another piece to cover the remaining third, and wide enough to lap over the first piece, the lap to run parallel to the cleft of the frog; then cut a strip about 1 inch wide to act as a keeper; the ends of this strip are pressed under the shoe, the strip passing across the foot from quarter to quarter.

Quittor.—A quittor is a running sore, situated on the coronet of the foot, with one or more tubes (sinuses) leading in a downward direction and discharging pus.

Causes.—Pricks in shoeing; punctures of the sole and frog; bruises, or suppurating corns.

Symptoms.—A swelling on the coronet, presenting a peculiarly unhealthy appearance, and in the center of which are one or more sinuses communicating with the diseased structures inside of the foot. In nearly all cases the horse is very lame.

Any legitimate business in your line is worth-while which adds to your profits without increasing your overhead expense.

Queries-Answers-Notes



THIS department is the meeting place where you are free to ask for information, answer questions, discuss shop matters and business conditions and any other notes you feel would be of interest to a fellow mechanic. Make use of this Department as often as desired.

Likes to Read the Price Lists—I always like to read the price lists of the different localities and shops, the former of course has a great influence on the price of different articles, but one of the main factors in making a fair profit in one's business is also the ability to get out a fair amount of work per day, for it does not profit a man to get say, \$5 to put in a wagon pole if it takes him all day to do it. This is a point I have never seen touched in any article I have read so far and I always think the customer should receive as much consideration as we do ourselves.

I, of course, use power in the shop, which in my case, is electric and costs me about \$10 a month. It blows two fires, runs one Canedy-Otto No. 16½ drill, wood planer and matcher, 9-inch jointer, double spindle shaper, rip saw, band saw, screw cutting lathe, two emery stands, boring machine, cut off saw. With the help of the various machines I can get out a lot of work per day; as an example, I recently got out and finished from the rough stock a complete set of bob-sled woods, three extra reaches and seven extra rolls and put a new runner in an old sled at \$3 for the runner and am nearly 60 years old but haven't thought much about taking a back seat.

V. Priessnitz, Wisconsin.

Another Convert—"We have been doing a general repair business on carts, buggies, wagons and all kinds of farm implements but are now taking on some automobile work. We have trouble in getting material to do the work with and it seems like we can't get 1½ by 1½ axles for wagons and carts.

"Business is fairly good here. There are three other shops in town but we get all we can do. We can't get any labor that is any good therefore, we do our own work. I always look forward for my paper as I like to read it and see what the other fellow is doing."

Harrell Brothers, North Carolina.

We agree with him—"Just a few words about your paper. I like it fine and think you have made a good step forward in adding the auto and tractor part to it.

"I don't do any repairing on engines yet, but I do quite a bit of other repairing, make new truck bodies and handle a few accessories. I don't believe in going into anything I don't know anything about too strong to start with.

I liked W. Bishop's talk on power hammers and I wish he would hit 'er up again as I have a Little Giant and like him—I believe in making it pay its rent.

"I make quite a few auto springs and it sure comes in handy for I don't believe that it pays to weld them when it does not take much longer to make one than

it does to weld it and besides when you make it and get it on the car you can feel satisfied that you have done a good job and that your customer feels better too.

"I have a pretty well equipped shop for iron work, with two forges, anvils, vises, trip hammer, emery stand, disc sharpener, lawn mower sharpener, power drill and a good stock of iron. I get good prices and am doing fine. I am in the draft though and expect to be called for service almost any day."

H. J. Cole, Iowa.

Maker of Miniature Horseshoes—Along with the rabbit's foot, the four leaf clover and other emblems of good luck, the horseshoe still holds its favor, so much so that Charles Gorsuch, a Pennsylvania Blacksmith, has autograph letters from Gen. Pershing, Premier David Lloyd George, Gen. Sir Douglas Haig and his wife, expressing their appreciation of the miniature horseshoes that were made and presented to them by Mr. Gorsuch. These horseshoes are hand forged and are less than a dime in size.

Recently the Pittsburgh-Gazette Times devoted an entire page to Mr. Gorsuch, showing facsimiles of the letters from the notables mentioned and giving an interesting sketch of Mr. Gorsuch himself.

THINGS THAT WE LIKE TO HEAR

"The high cost of farm implements and automobiles is making repair work pay as it never has before. I am busy but not too busy to miss my paper every month, so enclosed find subscription. This shop don't run good without the magazine."

G. F. Plummer, Iowa.

IS GOING TO SPECIALIZE

"I am trying to take up repair work on Fords and am getting along fine so far. I am selling different kinds of gas savers, anit-rattlers, braces, extra plugs and in fact everything that will suit the people.

Fred Vasquez, Colorado.

A Good Thing to Have Around—"Will say that the book you sent me on 'How to Collect Smith Shop Accounts' helped me some in collecting old bills and must say that the book is a good one."

Julius Nolte, Texas.

Some Tips on Brazing — Blacksmiths are being literally forced into the auto repairing business and a knowledge of brazing comes in very handy in the repair of autos, and there are other things that are repaired best by the brazing process.

A good many blacksmiths now possess acetylene welding machines so it is possible for them to weld jobs that the fellow without the welding torch would have to braze.

In taking up work of this kind much will depend on the ingenuity of the workman

and while I do not claim to be a professional brazer I manage to take care of nearly everything that comes along and, not having any other method of heating, I use the forge for the purpose and get along very well.

A good thing to experiment on is small ferrules for file handles. I mention the ferrules simply because they present the easiest means for an experiment, for the ends are held together and it is only necessary to put on the flux (borax) and the brass, or spelter, and hold in the fire until the brass flows. Do not heat too fast and have all parts to be brazed bright and clean. Old dry battery binding post screws and nuts make brazing material that is very good, and after a few such experiments along this line the beginner will speedily master the idea.

A kink for repairing a bicycle crank where the thread is worn out on the pedal end. Ream out all the threads and a little more. Saw off a piece of brass tubing the proper size and length and braze into the pedal and tap out for the crank and you have as strong a job as the original and a much neater one than if you try to close it together with a hammer.

U. G. Neale, Connecticut

INTERESTING PRICE LIST

The price list adopted by the Mechanics' Mutual Benefit Association of North Dakota among other things contains the following suggestions for prices on automobile and similar work.

	Cash	Credit
Repair work by hour, stock extra	1.00	1.10
Work at forge and machinery	1.50	1.65
Automobile Work per hour	1.00	1.10
Welding Automobile springs, up to 1½ in.	1.00	1.10
Welding Automobile springs, 2-in. and wider	1.25	1.35
Oxy-Acetylene Welding, per hour, labor only	1.50	1.65
Charcoal for preheating, per hour .....	.07	.08
Preparing work, per hour ..	1.00	1.00
Finishing work per hour ..	1.00	1.10

The cost of the oxygen and acetylene gases is estimated to cost approximately ten cents per cubic foot aside from labor and materials.

Start Repairing Auto Tires, —make automobile profits. Everyone connected with the automobile trade is making big money, you can too. The demand for tire repairing is enormous and increasing all the time.

The government by its embargo on the importation of crude rubber will necessarily limit the production of automobile tires and prices will go up. Owners will take better care of their tires and give more attention to getting cuts and punctures repaired.

Thesupplies and apparatus for this work cost little. You can find a vulcaniser to meet your purse. The work is clean and simple and the profits quick and large.

Write to our advertisers who make or sell vulcanizing outfits for particulars. This is not a boost for our advertisers it is intended not as a broad hint but bold statement of fact to yourself to take advantage of the opportunities that this work offers.

Tire repair profits have been fine in the past but the future will see them grow bigger and better.

From New Zealand—It's a long way from here to there and like the British Empire, the sun never sets on our readers, so Thomas Shaw, when he renewed his subscription also subscribed for a friend who he feels has been missing something good.

"I am one of your oldest subscribers and I treasure up all of the back numbers like many. I have a machine shop, gas engine, power drill, emery grinders, blower and two forges carpenter and machinist's benches, three sets of Little Giant taps and dies and plenty of tools

but I do not do work for customers, I just keep it as a useful hobby as I am not depending on blacksmithing and boiler-making for a living as I did once."

Don't Believe in Price Cutting—The following are extracts from newspaper clippings, the first from Minnesota:—

"Two blacksmiths in Lake City recently joined forces on account of the scarcity of help. Since his son was drafted, Charles Pearson has been unable to secure help and Thomas Hall closed his shop and moved in with Pearson." This is what we would call "Co-Operative Competition."

The other instance comes from Michigan.

"Frank Baker has bought the Peter Bauer blacksmith shop across the street from his own and is to move into the same."

"SHORTS" IN SPARK PLUGS, AND HOW TO TRACE THEM.

A Short Circuit or "Short" as it is briefly called is really nothing more nor less than a "short cut." In other words, the electricity does not like to follow the path that man has prescribed for it but likes to climb over or crawl thru the fences wherever it can easily do so. The "fences" along its pathway are the insulators such as Porcelain, Mica, Rubber, Fibre, and every space or distance thru dry air may be considered a sort of insulator.

In a Spark Plug the insulator is made of porcelain, mica or glass. It is necessary that the spark jump across the "gap" of the plug points, which space measures slightly less than 1/32". It will always do this unless a drop of water, carbon or a crack in the insulator gives it a path or "hole in the fence" which it is easier for it to pass thru than to jump the gap under compression conditions in the cylinder. In this connection it should be clearly understood that a spark plug cannot be successfully tested outside the cylinder (in the open air) as it is comparatively easy for it to jump the gap outside of the compression and other conditions that are found in the cylinder.

The only sure way to trace a 'shorting' spark plug is to test each plug with the engine running fairly slowly and after it (the engine) has warmed up to its usual operating temperature. Test the plugs with a screw driver, hammer or other metal tool having a wood or insulating handle. Place the metal of the screw driver or hammer in contact with the metal of the engine near the plug to be tested and tip the tool over against the top end of the plug so that the metal of the tool makes a complete path for the electricity from the top of the plug to the metal of the cylinder. If such a test causes the engine to slow down then that plug is O. K. but if it makes no appreciable difference in the running of the engine then the plug is "missing" and must be removed and cleaned, inspected and replaced or a new plug substituted. Very fine cracks in the porcelain will cause "shorting."

C. L. White.

From the Land of Kerman—Kerman is a small town situated in a tract of some 30,000 acres of country which embraces what is known as the Land of Kerman. Incidentally, we might add, Kerman was the first to go over the top 100 percent in the Third Liberty Loan drive. When we say first, we mean the first district in the grand state of California to exceed its quota 100 percent (more cheers).

RUN OF MINE NEWS

"A. D. Canaday has moved to Whitney and is building a garage and going into the auto repair business. Friend Canaday is a good mechanic and energetic workman and no doubt will make good."

"H. A. Vigness has bought the blacksmith shop at Highland from M. Oppenrud & Son. He intends to add a garage to the shop in the fall and be ready to attend to all the repair wants of that community. Mr. Vigness is a hustler and deserving of success."

"The old livery barn that was built when this city was quite young, is being torn down and a garage is to be built on that location. C. Dovenbarger now owns it."

"Lafayette, is now without a blacksmith shop. This is due to the fact that the Nelson Bros. shop has been closed. George the younger member of the firm has gone to war and Abby the older brother, is expecting a call to the colors. There is now an excellent opening for someone to come in and start a blacksmith shop."

"E. S. Redden is building a garage on his lot north of his blacksmith shop, with living rooms overhead."

The city of Fresno is 16 miles from Kerman—Fresno is the largest city in the San Joaquin valley, nevertheless Fresno is 16 miles from Kerman. Kerman is not 16 miles from Fresno.

Our section raises alfalfa, stock and raisins. There are four shops in Kerman city, one blacksmith shop, two garages and our own shop which is half and half, by which we mean that automobiles are a side line of the blacksmith end.

We run two fires and have two mechanics on engines and autos with helpers.

It is our aim to co-operate with our competing shops and in fact we try to boost our so-called competitors when they let us.

We are paying 62½ cents an hour for smiths and 50 cents an hour for engine and floor man.

We find some slight delay in getting some classes of stock but on the whole are well supplied by the jobbers in this section.

Our large accounts are allowed 30 days and no longer and we see the day coming when practically all our business will be done on a cash basis.

We think the blacksmiths, tractor and engine repair men, as a whole, are a mighty important people.

How many smiths have had a man rush in with a broken or bent rod, axle or track plate off of a tractor and hop up and down and say he had a crew of men waiting on the needed repair. Maybe another man comes in with a shear that should have been sharpened sooner and tells the smith he must have that shear in a little less than no time as he has a team waiting on it. Another time friend farmer gallops in and wants a man quick, to start an engine that has laid idle all winter or during the off season and of course he hadn't got around to overhauling it before his ground is in need of water.

These related experiences are no doubt common to the ordinary shop, but they bring out the point that the smith and

engine men are very necessary factors in the farming industry.

We keep as accurate a check on our business as is consistent without creating a lot of additional overhead expense and are getting away as much as possible from giving a lump price on any work whether big or little, except in the case of plow shares and that class of work with which we agree with competing shops on prices. It is our aim to make the charge by the hour and by the weight of iron and of course other materials at list prices.

One method we found of figuring the weight of iron stock on any job is by a table of weights which can be found in most of the catalogues issued by the jobbers. That is a method that has been available for years, but how many small shops have taken advantage of it?

In our town, the competing shop was taking a guess at the iron on any job and we cut a table of weights out of a catalogue, had it framed and presented it to our competitor with our compliments.

Our competitor tells us that this table is the most valuable thing he has in the shop.

C. G. Wetmore.

This is the kind of a letter we like to get and the only thing we regret is that just at this time we can't show you a picture of Mr. Wetmore's shop. Westerners as a class are noted for the pride they take in their home community, their progress and their liberal mindedness and if you have read Mr. Wetmore's letter you will agree with us that a liberal application of these qualities won't hurt any of us very much—Editor.

WHAT THE RETURNS SHOW

A couple months ago, several hundred blank forms were sent to owners of blacksmith shops throughout the United States. On each of these blanks there were 23 questions. The same number of blanks were sent to shop owners in each of the 48 states. These blanks have practically all been returned and the results are worth noting.

Of all the blanks that have been returned to us there is only one case where the owner makes allowance from his income for his own salary; merely living from hand to mouth, so to speak. There were only a few instances where the shop owner knew accurately just how much business was done and most of them didn't know how much they cleared on their last year's business and the percentage of profit that should be figured on work was figured as low as 25 per cent in one case.

The total business expenses of most of those who replied to our questions was as much a mystery to them as the hypothesis of the solar nebulae is to all of us.

So much for the business end of this questionnaire.

Do you know of men in any other line of business that would be guilty of admitting that they didn't know how much their profits were, what their cost of doing business for a year was or that they did not figure a fixed salary for themselves. You Do Not—do you?

"Are you doing any automobile repair work" and "if so, do you find it profitable?" were two of the questions included on the list and we were hardly prepared for the answers we received on these questions. Seventy-two percent. of the shop owners who returned the blanks sent to them indicated that they Are doing automobile repair work and that they are finding it Profitable.



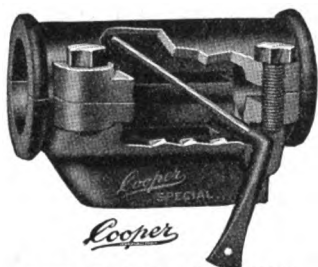
Accessories and Supplies of Interest to the Trade

THE SUNDERMAN CARBURETOR

Practically 100 percent increase in business over that done last year tells better than anything else of the merit of the Sunderman Vacuum Carburetor.

A Sunderman will save from 30 to 50 percent of the consumption of gasoline and will give more power than your motor ever showed, and will make your car climb hills like a scared rabbit. It gives speed, more rapid acceleration, quicker pickup, greater flexibility and more freedom from gear shifting.

The Sunderman carburetors are made in several sizes and models for all cars, the Ford Model retailing at \$6.



THE COOPER CUT-OUT.

If you want additional information or details of construction and performance of the Sunderman Vacuum Carburetor address your letter to the Sunderman Corporation, Newburgh, N. Y.

A NEW IDEA IN SEAT COVERS.

Attractiveness, cleanliness and economy heretofore have been the virtues of Seat Covers, but now the new three piece or "Sectional Overlap Lazyback" Seat Cover adds another and more practical feature to the popular "Gordon" Covers—complete riding comfort.

This three piece construction gives free and complete ease of movement to the upholstered lazyback and arm rests. The springs are bound in no way; the independent action of each arm rest and the lazyback is not impeded. You can lounge back into the depths of the upholstery in the corner of the seat in solid comfort. The overlap at the corner gives with every movement of the upholstery.

All misfit troubles are overcome by this overlap construction. Should the upholstery on your Car be heavier than on others of the same model, or if it is a little

lighter, either of which are common variations, the lazyback cover overlaps more or less on the arm rest sections, as the case may be. A misfit is impossible.

This style of "Gordon" Covers will give better service because all strains on fabric and fastenings is relieved. There are no seams to rip.

If a spot is damaged by some unusual wear or a bad stain, only that section need be replaced.

Attaching "Gordon" Seat Covers is merely a matter of following completely illustrated instructions. Any one can put them on. You cannot misplace a part. Put on one section at a time; the next fits to it easily.

"Gordon" fabrics are beautiful durable materials, tested for wear and color. Wearing qualities are secured by special weaves and having the materials extra heavy. Color is obtained by dyeing yarns before being woven.

"PROFITS IN MAKING MOTOR TRUCKS"

We wish to call our readers' attention to the advertisement of the Lakeside Motor Truck Company starting in this issue on page three.

There is an excellent opportunity offered you in selling and attaching Lakeside Axles for farmers, merchants and business houses in your locality.

While at present this firm are only prepared to furnish their axles for Fords, a little later they will have Lakeside Axles available to fit any car; whether it be a Pierce-Arrow, Packard or Buick, and change it into a reliable durable motor truck for carrying or hauling.

We suggest that our readers get in touch with this firm and secure their agency for your locality. You can use the coupon in the advertisement or write to the Lakeside Motor Truck Company, Dept. A. B., 2210-12-14 South Michigan Avenue, Chicago, Illinois.

WORKRITE COMBINATION OUTFIT

As you know, storage battery life depends on frequent testing with the hydrometer set and frequent application of distilled water to keep it at its maximum efficiency. Every battery owner knows this and the WorkRite Mfg. Co., of 5618 Euclid Ave., Cleveland, O., have placed on the market their WorkRite Combination outfit which consists of a high grade battery hydrometer fitted in a glass jar for holding distilled water. The large rubber

battery hydrometer fitted in a glass jar for holding distilled water. The large rubber collar on the hydrometer makes the jar dust and evaporation proof, and always ready for testing or filling the battery.

The WorkRite Combination Outfit is being advertised very extensively in owner magazines. Put in a stock and get your share of the profits. Every car owner who sees one wants it. The retail price of this outfit is \$1.50 which is very little more than the cost of a first class hydrometer set alone.

Write today to the WorkRite Mfg. Co., for full description and discounts.

SOLVING THE PROBLEM OF POOR—GRADE GASOLINE.

The Ford Engine was designed to attain its maximum efficiency with good gasoline, and while it is splendidly designed and perfectly balanced, the carburetor is only capable of producing the full efficiency of the engine on high-grade gasoline.

Everybody knows how poor gasoline is these days. And the prospects for improvement are discouraging. Hence, some



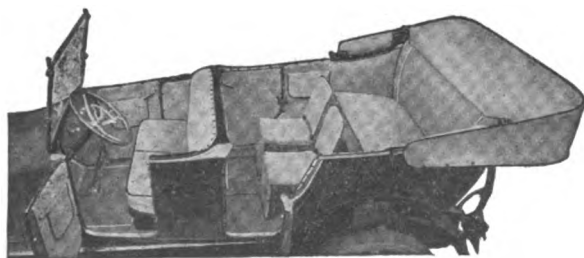
ATTRACTIVE DISPLAY OF THE FAMOUS NORWESCO AUTO PRODUCTS

step must be taken to supplement the present Ford carburetor with a device which will develop the full rated power and speed in spite of poor fuel.

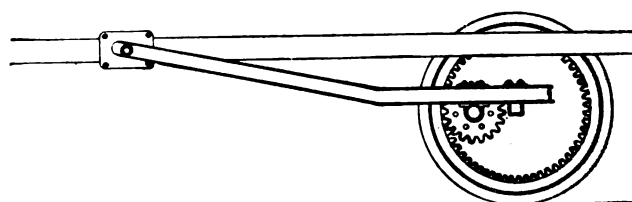
The Gasoline Economy Company offers to Ford owners a means of accomplishing this with its GAS-E-CO system, which consists of a highly-efficient vaporizer, automatic needle-valve control, and decarbonizer.

Complete and instant vaporization is insured at all engine speeds, giving quick combustion and the maximum expansion

Continued to Page 36.



GORDON SECTIONAL OVERLAP SEAT COVERS



LAKE-SIDE MOTOR TRUCK UNIT

AMERICAN BLACKSMITH AUTO & TRACTOR SHOP

VOLUME 17

AUGUST, 1918

NUMBER 11

BUFFALO, N. Y., U. S. A.

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Remittances may be made by money order, express order or checks payable to the American Blacksmith Company. We will also accept uncanceled postage stamps or currency, but for safety these should be sent by registered mail.

Subscribers should notify us at once of non-receipt of paper or change of address. In latter case, give both old and new address.

Correspondence on all smithing subjects solicited. Always give name and address, which will be omitted in publishing, if desired. Address all communications to the

"AMERICAN BLACKSMITH COMPANY"
BUFFALO, N. Y.

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Cable Address: "Blacksmith, Buffalo"

Patriotism and Petroleum

Unquestionably there isn't all the gasoline that everyone wants, on hand or in prospect. But equally unquestionably, the gasoline situation is entirely different from and much improved over what it was when the war began, and—best of all, it appears to be getting better all the time.

We are asked not to run our engines idle. If 4,000,000 cars eliminated one minute of idle running per day, enough gasoline would be saved to run a hundred cars for a year averaging two hours per day per car.

We are asked to look to our carburetors. Particularly is the new driver urged to look to his carburetor. All new cars, properly looked after by the man who sells them, have rather rich adjustments to the carburetor. A new engine is stiff and should not receive the heavy, sharp blow of a lean mixture explosion. New owners who do not make a readjustment after five hundred or a thousand miles are simply blowing their money through the exhaust pipe, and at the same time sending up in black smoke gasoline that might be used to push some other fellow's car around.

Now—a note of warning. Uncle Sam has gone into a regular he-war with all his power. He proposes to do his share and a little bit more towards winning it. He can't do it alone. The gasoline situation is infinitely better than it was—there is plenty of gas for careful use. There isn't a drop to waste.

Hence—don't rest contented with the statement that it's all over but the shouting.

Instead—do your bit by helping conservation. Buy good gas, and use it wisely. Run your motor as if you were running it for the government—as you are—carefully. Stop the leak, avoid the waste, cut out the absolutely needless joy riding and then—and not until then—turn on the optimism pipe and let it run full tilt.

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RURAL MOTOR EXPRESS LINES

With the railroads devoted almost entirely to the winning of the war and the consequent preference given to the haulage of war materials and fuel for the munition factories and the transportation of the finished product to the seaports, not to mention the thousand and one other demands that the nation's war activities demand of the railroad facilities at hand, the small shipper is subjected to unusual hardships to get his product to the purchaser and this is particularly true where but comparatively short hauls are required.

This condition has brought about the establishment of numerous Rural Motor Express Lines throughout the country. It is estimated that 20 per cent. of the farm labor of the country is now wearing Uncle Sam's uniform and this leaves the farmer with but little time to look after the shipment of his produce to the market and this naturally results in waste and reduced plantings.

Opportunities for the establishment of such motor express lines open a field for the man who has only one truck and for the organization of companies with considerable capital to embark in a profitable enterprise and at the same time help their country in its time of need.

Investigations in almost any locality will reveal productive areas having poor transportation which would welcome and support truck service.


The National Motor Truck Committee, 7 East 42nd Street, New York, has prepared pamphlets covering every phase of the "Organization of Rural Motor Express Lines." The cover of the plan of organization, service to be rendered, charges, sample cost sheet, preliminary survey of the route, canvass of prospective customers, operating suggestions, advertising and general suggestions. Any or all of these may be obtained by any interested person free of charge on request to the above.

DON'T GIVE MONEY TO AGENTS

The American Blacksmith, Auto & Tractor Shop DOES NOT employ subscription agents. Any person representing himself as such is an impostor and should be so dealt with. Notify us immediately if anyone claiming to represent this journal calls upon you.



Much apologies to FarmImplement News.

 WHETHER EARLY RISING IS HEALTHY OR NOT DEPENDS ON WHETHER YOU'RE A BIRD OR A WORM

The Care of the Inner Tube

ALBERT MARPLE

PROBABLY no part of the automobile demands more careful treatment, if satisfactory results are to be obtained, than does the inner tube, but the chances are that, with the exception of the casing, no other part of the car is more generally abused. There is nothing quite so dead as an automobile without pneumatic tires, and to enjoy the pleasures and comforts of "running on breeze" the motorist simply must have tubes that will retain air. It would seem, then that the care, as well as the repair, of the tube is of vital importance to the owner of the automobile. Many motorists do observe some of the rules relating to the care of tubes, but there are some who, apparently, care nothing as to how their tubes are treated. As a general thing, too, the motorist who abuses his tubes is just the one who "gets sore" when they give way as a result of abuse, and who, at the appearance of trouble, makes a bee line for the replacement man. It is really wonderful how unconcerned some of these fellows can appear when asking for a new tube.

As a rule, tube troubles appear just when least desired—in the middle of the desert, on the steep grade of the mountain pass or at some other place miles from any repair station. At these times the "silv'ry lining" disappears and the "glooms" loom up on the horizon. In such instances some motorists give vent to their feelings in a flow of pet expressions, others produce the flask, while others fret themselves into an "awful stew." Common sense will show that all of these methods of procedure are entirely wrong. No situation calls more for the exercise of more common "horse sense" than does this one. To replace the tube in a hurry probably means more trouble a mile or so up the road.

Probably the most common of tube troubles is that called pinching. This generally results from placing the tube in the case in an uneven manner, or in twisting it

as it is being applied. By these methods of applying the tube it is caused not only to overlap, but to wrinkle, with the result that within a short time it will be cut



THINGS LIKE THIS HAPPEN JUST WHEN THEY'RE NOT WANTED TO.
"PINCHED" INNER TUBES.

through at some point where it has been overlapped, this resulting in a leak. This trouble is also sometimes caused by putting a new tube into a tire just as it has been taken from the box. When the tube is

applied in this manner and the tire is mounted on the rim and the air applied, there is such an inrush of air that it will often buckle up the tube thereby forcing a tiny section of it beneath the bead spreader. This will occur especially if the valve stem has not been pulled out to its proper position. In an event of this kind the portion of the tube which has been caught beneath the bead spreader will be pinched off when the air is applied. Prior to putting the tube in the casing the operator should give it a couple of "shots" of air and should see that no two parts of it are sticking together. Once in the case it should be talced carefully, the fingers being forced around the tube to make sure that the talc is well distributed, then, before the loose bead of the casing is applied, a little more air should be forced into the tube—sufficient to round it out nicely, this making it impossible to become pinched. The loose bead of the casing may then be applied and the tire inflated to the proper pressure. Every step in the application of the tube should be taken slowly.

It is possible to use too much talc, or the like. Soap stone, flaked graphite, talc, etc., will serve to keep the tire from sticking to the casing, but the use of too much of either of these will prove disastrous. The excess of these materials has a tendency to gather in one part of the casing and to eat into the tube. On the other hand, if no substance of this kind is used, it will take but a short time before the heat generated will partially, or completely, cook the tube. There is also a tendency of the tube becoming baggy, through being stretched, and the baggy tube is liable to overlap and pinch. Underinflation of the tire also spells ruin to the tube. When the under inflated tire passes over a stone or other hard, sharp substance, the casing and tube are bumped against the rim. In practically every instance of this kind the tube suffers, al-

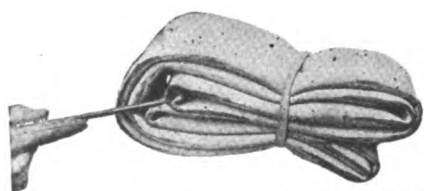
though the bump may not be severe enough to injure the casing. This weak spot in the tube soon springs a "leak." The bead of the under-inflated tire has been known to



RIP CAUSED BY RUNNING ON FLAT TIRE.

jump out of the clinch while the car is rounding a corner. What happens to the tube in a case of this kind is a shame. If the tire is kept pumped to the pressure recommended by the tire manufacturer these troubles will not be experienced. The moment the tire deflates to a certain degree the casing starts to slide circumferentially of the rim, while the tube, being held in place by the valve stem, is unable to move. Unless the tube is talced well it will stick to the casing and Zingo—off comes the valve stem. Moral, keep the pressure up. In case of a puncture the car should be stopped at once and the tire repaired. If the tire is deflated by being pierced by a nail or similar object, to run it flat may ruin the tube. As the wheel revolves the nail is forced farther and farther into the tire until, as the tire deflates, it reaches the inner side of the tube. Consequently, as the wheel revolves the nail pierces the inner side of the tube in many places, often resulting in its complete ruin.

Another frequent cause of trouble is sand in the casing. Very often, when the tire is repaired on the dusty road the tube is applied without being first relieved of everything that resembles sand or dirt, and this substance is carried into the casing. These tiny particles of sand are sharp-edged and before a great while these result in small pin-holes appearing in the tire, these being large enough to permit air to escape from the tire,



TUBE WORN ON CREASES BY CARRYING IN THE TOOL BOX WITHOUT BEING COVERED.

but hardly of sufficient size to make a bubble when tested in water. A tube thus treated very often goes back to the tire maker as "porous." An undersized tube should not be used in an oversized casing. This practice strains the tube and is conducive to bagginess.

Grease, sunlight, oil, water, etc., are natural enemies of the tube, just as they are to any other article of rubber, and they should not be permitted to come in contact with it. Tubes should not be carried loose in the tool box for nothing will ruin them quicker. A small, grease—and water-proof bag, which may be purchased at any automo-



RESULTS LIKE THIS ARE OBTAINED BY USING TOO MUCH POWDER IN THE CASING.

bile supply store, is the best thing for this purpose. Don't carry the tubes where the acid from the battery may splash on them, for this chemical will eat holes in them in a little while, these holes later resulting in leaks.

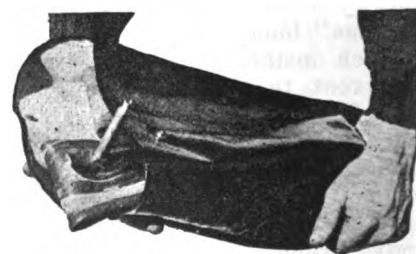
We are told that more than half of the tubes taken back to the manufacturer for replacement are in the true sense of the word "victims". The motorist's tube troubles are results, to a very great extent, of carelessness. While the repair of the tire is very important, we are inclined to think that if the motorist will give a little more consideration to the care of the tube, about 75 per cent. of the repair work may be eliminated.

SUMMER COMPLAINTS

This is the season of the year when overheating troubles begin to be more or less chronic. There are many causes of overheating and the novice often has trouble in locating the real basic cause in his particular case. The cooling system is the first place to suspect. Any obstruction to the free circulation of the water results in overheating in hot weather. The rubber connections should be examined and the radiator drained to see if the water flows freely from top to bottom. After emptying the water system, pour water in the radiator and see if it flows down quickly. Sometimes a drain cock may be clogged, inducing a restricting flow inside. Run a piece of wire up the drain cock to dislodge the obstruction. If there is an overflow pipe, see that it is not clogged. Dirt often gathers in the lower opening. Tighten the fan belt to remove possible excessive slippage. It must be remembered that overheating sometimes results from bad handling of the car, from trouble in the lubrication system, ignition system, etc. But the first place to look is the cooling system itself.

DRILLING HARD STEEL.

In preparing a drill to be used on hard steel, the drill should be heated to an even red heat, the scale removed and the tip of the drill be touched to a drop of quick-silver and then be quenched in water. After this treatment the drill will go through the hardest steel without trouble. A simple method of tempering small tools quickly is to heat them red hot and then thrust them into a potato, after which they should be drawn to the correct temper to remove brittleness.



INNER TUBES PROTECTED BY A WATER AND GREASE PROOF OIL CLOTH BAG.

A hood that has a tendency to rattle with the vibration of the motor may be silenced by drilling a series of holes in the band of metal on which the hood rests and threading a strip of leather through the holes.



T. Northwood

Approved by British Postal Censorship

AFTER dealing with several broken chassis, with a sprinkling of smaller jobs thrown in, we began to experience trouble in large lots in the shape of broken crown wheels. I suppose the bad state of the roads was responsible for this and as this often meant a towing in job, a gentle prayer was usually offered for those responsible for the war, when the message came through at perhaps nine or ten o'clock at night for fitters to go out and assist in getting the cripple home. I suppose the demand for crown wheels at this time was great as at times it was very difficult to get them. This often resulted in a condition where it became necessary to rob Peter to pay Paul, for instance, if a car was in the workshop with a broken chassis the back axle would be removed and the crown wheel taken out and changed over to the car that only needed the wheel. By doing this the number of cars out of commission at this time thus was kept as low as possible and of course, as new parts arrived these were assembled and the cripples were able to be on their way again.

While speaking of crown wheels, several were broken at the same time and as no new ones were forthcoming at the moment it was decided to convert two broken wheels into one usable one to get out of the difficulty.

This job was accomplished by accurately sawing and fitting two sound halves together in such a



MR. NORTHWOOD'S EIGHTEEN YEAR OLD SON SERVING WITH THE ROYAL FLYING CORPS.

manner that when they were bolted in position no division was noticeable. Of course this was not expected to be a permanent job, but it justified the experiment and several cars ran some hundreds of miles with wheels made up in this manner. In the meantime the new ones came along and took the places of what had been a successful makeshift. I believe the illustrations are sufficiently clear to enable the reader to see how this work was done and as you will probably guess, this is no job for an amateur and if attempted is should be in the hands of an experienced mechanic.

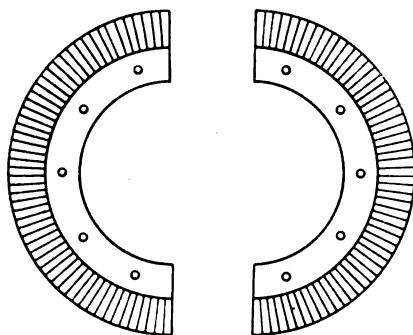
In dealing with the rear axle jobs that required towing in, the services of our spare lorry (truck) was needed and utilized for this purpose so I must tell something about a very useful portable tripod that we made and fitted to the rear of the lorry and which I can recommend to anyone using a lorry for similar work. The advantages of a hoist of this sort are easily understood as it is easily made and not being permanently attached

can be put up or taken down in a few minutes.

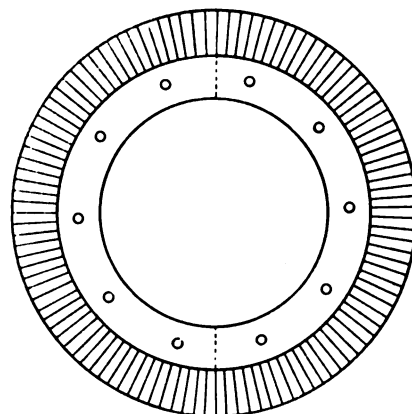
In use a chain is put around the front axle of the disabled car and with a set of chain blocks the end of the car can be raised clear of the ground, the tripod carrying the weight. By this means the car would be towed to the workshop where it could be more efficiently dealt with than on the roadside. I will endeavor to make the description of this tripod as simple as possible by showing a sketch of the parts and giving the dimensions of the materials required for the job.

Any old stock, either iron or mild steel will do, providing it is sound and free from flaws. For the uprights use two pieces of $1\frac{1}{2}$ inch round stock, $6\frac{1}{2}$ feet long. The center piece for the top is made about 9 by $1\frac{1}{2}$ by $\frac{3}{4}$ with a ring in the one end. An ordinary clevis clips these three pieces together, taking a $\frac{3}{4}$ inch bolt. A ring and eye bolt fixed in the floor of the lorry and preferably attached to the frame to withstand the strain, is used to support the tripod. A chain about 12 feet long and having a hook at each end for the eyebolt and the tripod completes the outfit. Two bearing plates about 3 by 5 inches are screwed to the floor of the lorry, where the uprights drop in, to protect the woodwork.

The usefulness of this outfit fully justifies the materials and labor required for its construction.



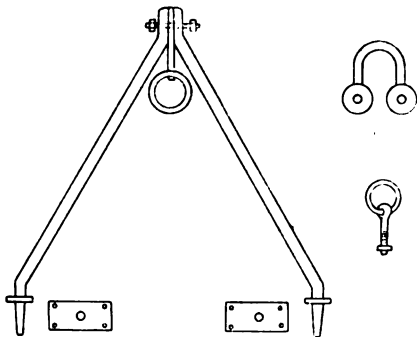
TWO BROKEN CROWN GEARS ARE PREPARED SO THAT THEY WILL FORM A PERFECT CIRCLE WHEN JOINED.



THE COMPLETED WHEEL WHEN JOINED AND SECURED AS SHOWN BY THE DOTTED LINES.

THE MANUFACTURE OF FILES.

For many years files were made entirely by hand, and at the present time the best files are still made in that manner. The file may be called a metal-cutting or abrasion tool, and it removes the metal by means of a series of sharp-edged parallel ridges all inclined at an angle of about 50 degrees to the axis of the tool. There are numerous types of file differing in fineness of cut, and these are all divided into two broad classes of "double cut" and "float cut", or a single cut." The former have two rows of cutting edges equally inclined



MR. NORTHWOOD'S DETACHABLE
TRIPOD FOR TOWING IN
CRIPPLED CARS.

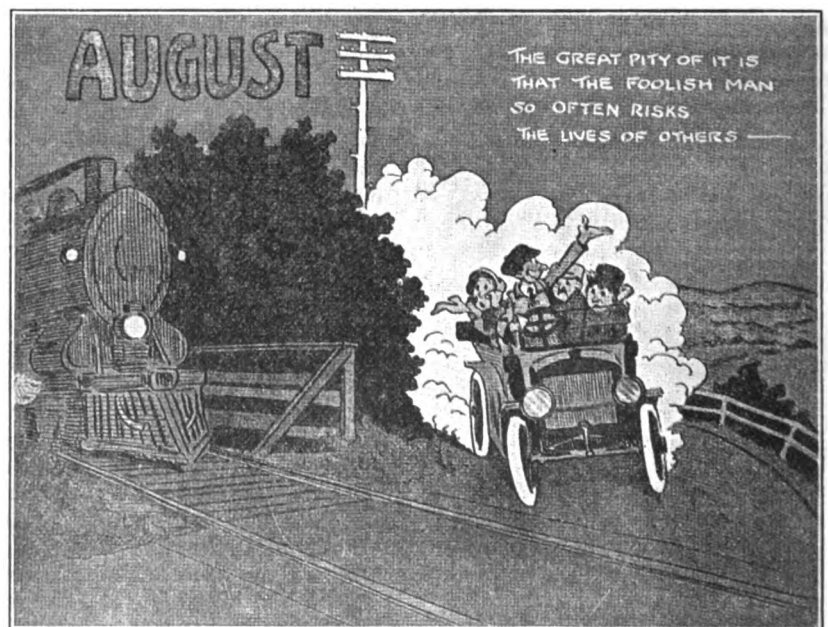
to the axis and the latter have only one. In preparing the files steel blanks are first forged from bars which have been previously sheared or rolled to the section required for the tool. This blank is, of course, of soft steel, and it is held on the anvil by means of a strap which passes round the tang and is held down by the foot of the operator. If the underside has been cut already, or is not flat, it is protected from damage by interposing lead or pewter as a soft support. Then, using a chisel which is rather wider than the blank, the operator makes a series of cuts parallel to each other and at the proper angle. The hammer is chosen with great care to be of such a mass as to cause the burr from each cut to rise to the right height. The distance of one cut from the next is gauged by resting the inclined chisel against the last burr when cutting the next. By increasing the slope of the chisel the distance apart of the burr is increased and vice-versa. It is obvious that the greatest skill and practice is required to strike the chisel with the right force, and to keep its inclination constant over many hundreds of cuts. The height of the burrs as well as their distance from each other governs the

fineness or coarseness of the cut. In the ordinary double-cut flat file there are 6 deg. of fineness respectively, called rough, middle bastard, second cut, smooth, and dead smooth. Float-cut files are made in the rough, bastard and smooth varieties. In making double-cut files the first series of cuts are smoothed over very lightly before making the second series. There is a file that has been made in Lancashire on which there were 300 cuts to the inch.

The rasp cuts in virtue of a number of triangular shaped projecting burs distributed over its surface. These are made with a three-cornered pointed punch or chisel. They are distributed as evenly as possible, the great object of the file-cutter being to arrange that one cut shall not come behind the other. There is thus great skill in arranging by the eye a pattern in which the number of cuts per square inch shall be uniform and yet in which they are rightly and irregularly placed relative to the axis of the tool. Rasps, again, are made in rough, bastard and smooth cuts. The wide use of aluminum has brought into use files of the "dreadnought" type. In these the cut is single and is normal to the axis, or nearly so. It is very coarse and the teeth are deep and triangular in section. As a rule they are not straight, but are shaped in arcs or circles arranged parallel to each other. This coarse type of file is necessary because the aluminum being soft rapidly clogs the teeth of the ordinary file, making the edges so that they will not cut. For the

purpose of filing up metal patterns, often on awkward concave surfaces it is best to take old files, and having softened them, to cut straight dreadnought type teeth on them with a three-cornered file. The files are then bent to suit the cavities and corners which have to be worked, and are rehardened by heating and plunging into oil. In this way a most ingenious set of tools can be made to perform all sorts of impossible jobs with ease and accuracy. Returning to the orthodox file cut in the soft steel blank, the next operation is to straighten the file out accurately. It is then hardened, the teeth being protected from getting burnt in the heating process. After hardening the quality of the cut is improved by exposure to a blast of fine sand.

Numerous attempts have been made even in the eighteenth century to devise machines to replace the hand file-maker. These all attempted to imitate his action by means of an arm carrying a chisel, the later being struck by a hammer, which is operated mechanically. The successful machines of the present day carry the blank on a table which advances very slowly under a chisel or hammer which reciprocates rapidly. By varying the rate of the transverse of the table the coarseness of the cut can be altered. But it still remains a fact that the hand-operator can make the best file, and this is attributed curiously enough to the advantage of a certain amount of irregularity in the teeth of the hand-cut file which it is very difficult, if not impossible, for the machine to imitate.



BE SAFE OR YOU WILL BE SORRY.

Seven automobiles were exhibited at the first automobile show.

In India the automobile was used in elephant hunting as early as 1896.

Motor mail wagons were introduced into service by the United States post-office department in 1896.

The signal corps was the first branch of the United States army to utilize the automobile in any capacity. This was in 1899.

In January, 1900, there were eleven gasoline automobiles in Cleveland.

An early manufacturer-advertiser said, "We furnish circulars free, and our large catalog ten cents."

A prominent physician of Youngstown, O., was the first member of his profession to make use of an automobile in his practice. This was in 1896.

DECIMAL EQUIVALENTS OF PARTS OF AN INCH

1/64—.01563	11/32—.34375	43/64—.67188
1/32—.03125	23/64—.35938	11/16—.6875
3/64—.04688	3/8—.375	45/64—.70313
1/16—.0625	25/64—.39063	23/32—.71875
5/64—.07813	13/32—.40625	47/64—.73438
3/32—.09375	27/64—.42188	3/4—.75
7/64—.10938	7/16—.4375	49/64—.76563
1/8—.125	29/64—.45313	35/32—.78125
9/64—.14063	15/32—.46875	52/64—.79688
5/32—.15625	31/64—.48438	13/16—.8125
11/64—.17188	1/2—.5	53/64—.82813
3/16—.1875	33/64—.51563	27/32—.84375
13/64—.20313	17/32—.53125	55/64—.85938
7/32—.21875	35/64—.54688	7/8—.875
15/64—.23438	9/16—.5625	57/64—.89063
1/4—.25	37/64—.57813	29/32—.90625
17/64—.26563	19/32—.59375	59/64—.92188
9/32—.28125	39/64—.60938	15/16—.9375
19/64—.29688	5/8—.625	61/64—.95313
5/16—.3125	41/64—.64063	31/32—.96875
21/64—.32813	21/32—.65625	63/64—.98438

The Automotive and Accessories Exposition

FIRST a haven of relief from the terrible heat of July and August 1916—in 1917 a barracks for engineers hastily mobilized by Uncle Sam for service with the colors—then a training school for ensigns of the United States Naval Reserve forces—and now to be used for the first time in a new capacity—to house a great national exposition of trucks, tractors and accessories in September—that in brief gives the history of uses to which Chicago's magnificent Municipal Pier has been put.

Chicago built its Municipal Pier far out over Lake Michigan for more reasons than one. But one important reason was to give this city the finest exposition headquarters on the continent. Up to this time, however, extraordinary occasions such as the quartering of fighting men, have prevented the Pier's being used for convention exhibitions, and to the Automotive and Accessories Exposition, September 14 to 21, falls the honor of being the first great show event in the history of the Pier. This exposition will, it is safe to say, inaugurate a long list of important conventions and exhibitions—for just as Chicago is the ideal convention city of the United States, so the Pier is Chicago's ideal convention center.

War-time trucks, from local delivery hustlers to the giants of trans-continental fame—tractors, the "greatest ally of the Allies" since the war began—and accessories

which increase mileage and service and decrease cost of upkeep and operation of motor cars—will be shown in all their business-like glory at the Pier from September 14 to 21.

When the exposition opens, the half-mile long display room on the north side of the Pier will reveal all the most important automotive factors which are increasing America's transportation facilities and thereby her food production.

"The country must have at once auxiliary transportation methods that will relieve the congestion on our steam railroads," said H. V. Buelow, general manager of the exposition. "One of the purposes of this Automotive and Accessories Exposition is to show the advantages of the motor truck for short and long hauls on the highways, and to teach the thrift and economy of the use of the motor truck on the farm as well as in the city.

"Another of the objects is to furnish to our giant Farmer-Brother an adequate substitute for his old system that will help him to achieve his and the nation's purpose. To that end the manufacturers of farm tractors will exhibit tractors at the exposition, demonstrate their use, and teach the farmer how to use them for the production of greater crops on more acreage and at less cost than upon his limited acreage under old conditions.

"Now, to secure greater effi-

ency and to concentrate upon those products most necessary to bring the great war to a quick and successful termination, our government proposes to curtail as much as possible the manufacture of passenger cars. Will this hamper or hinder the industry? Not in a million years. The manufacturer of passenger cars will simply use his surplus raw material, his full crew of employes and the full capacity of his plant in the making of war materials or other products necessary in carrying on the war.

"But what of the people who want to buy a new automobile as an economic necessity rather than a luxury? Will this curtailment of new cars act to the detriment of the country—a hardship at a time when we should show the world how to carry on our business with greater enthusiasm and energy than usual?

"That is another problem which the Automotive and Accessories Exposition will undertake to solve—and in the following manner: Accessories, parts and attachments for every make of passenger car will be displayed and demonstrated in our big Accessories section.

"Accessories have now become necessities. These accessories which will be displayed in the coming Automotive and Accessories Exposition will be the answer to the question of probable car shortage. They will solve the problem by demonstrating that old cars may be economically and efficiently re-

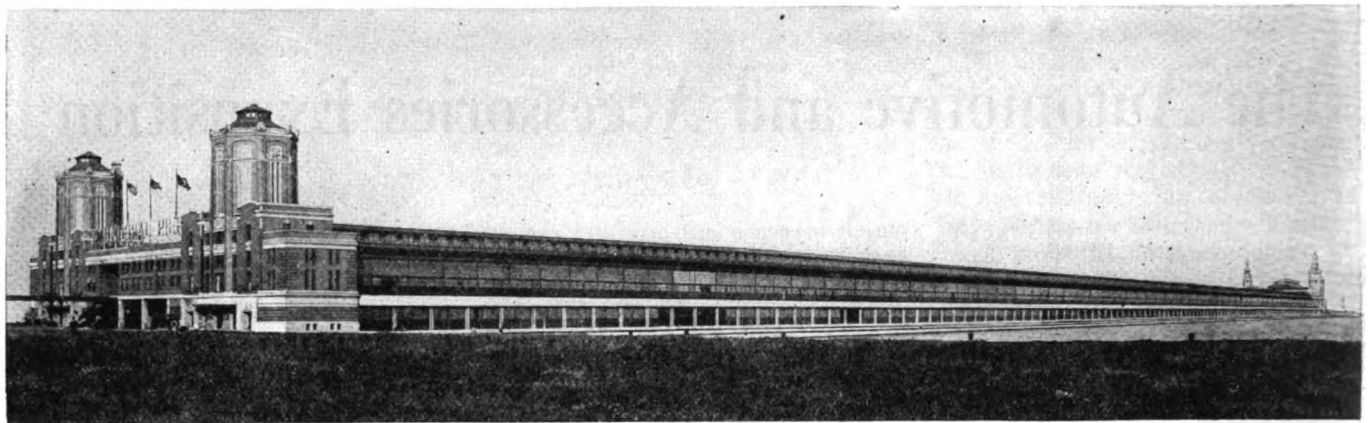
stored and continued in service for an indefinite period. And the accessories section will prove that there are accessories to be had which, when applied to the passenger cars, will double and sometimes treble their life besides adding to their efficiency and comfort.

"The automobile accessory business has grown during the past few years to such proportions that only a few today appreciate its size and importance.

"Chicago is coming back into the same boosting harness that made the World's Fair a success. Chicago will see fit to take official civic cognizance of the Automotive and Accessories Exposition, and to boost

Oakfield, Wis.; Champ Spring Co., St. Louis, Mo.; Standard Underground Cable Co., Pittsburgh, Pa.; Metal Ware Corp., Chicago, Ill.; Burgess Mfg. Co., St. Joseph, Mich.; Blake Mfg. Co., South Bend, Ind.; Challoner Co., Oshkosh, Wis.; Cooper Auto Specialty Co., Thomasville, Ga.; Motor Car Equipment Co., New York, N. Y.; The Duplex Engine Governor Co., Brooklyn, N. Y.; Van Cleef Bros., Chicago, Ill.; Edelman & Company, Chicago, Ill.; Cummings Foster Corp., Chicago, Ill.; Perry Auto Lock, Chicago, Ill.; Defender Auto Lock, Detroit, Mich.; McIntyre Mfg. Co., Chicago, Ill.; The Dayton Wire Wheel Co., Dayton, Ohio; W. D. Sullivan, Chicago, Ill.; Dole Valve Co., Chicago, Ill.; Empire Auto Specialty Co., Chicago, Ill.; Koupet Auto Top Co., Belleville, Ill.; Heinzelman Bros. Co., Belleville, Ill.; Presto Cloth Mfg. Co., Toledo, Ohio; Wood Hydraulic Hoist Body Co., Chicago, Ill.; A. A. Lawder Sons Co., Chicago, Ill.; The Wyman Sales Co., Chicago, Ill.; Balso Oil Co., Toledo Ohio; Balso

L. P. Halladay Company, Streator, Ill.; New York Coil Company, New York, N. Y.; A. C. Savidge Company, Indianapolis Ind.; Cuno Engineering Corp., Meriden, Conn.; Cole Gasoline Gauge Co., Chicago, Ill.; Wright Roller Bearing Co., Philadelphia, Pa.; Newtone Horn Company, Brooklyn, N. Y.; "X" Laboratories, Boston, Mass.; Hudson Motor Specialty Co., Philadelphia, Pa.; Jas. P. Neerup Co., Chicago, Ill.; F. W. Oettinger Co., New York, N. Y.; Lockfast Tire Carrier Co., Cleveland, Ohio; Standard Speedometer Company, Boston, Mass.; General Appliance Co., Boston, Mass.; Hansen Manufacturing Co., Cleveland, Ohio; Gibraltar Jack Co., New York, N. Y.; Bell Manufacturing Company, Detroit, Mich.; Continental Piston Ring Co., Memphis, Tenn.; A. E. White Machine Works, Eau Claire, Wis.; Harris & Reed Company, Chicago, Ill.; Barcolo Manufacturing Co., Buffalo, N. Y.; Friden Manufacturing Co., San Diego, Cal.



MUNICIPAL PIER, CHICAGO. SCENE OF THE NATIONAL TRUCK, TRACTOR AND ACCESSORIES EXPOSITION SEPTEMBER 14 TO 21, 1918.

this exposition because it belongs to those things which have made—and will continue to make—Chicago big. Chicago is going to boost it because the National Automotive and Accessories Exposition is a big, unselfish proposition based on patriotic expediency and sound industrial and commercial necessity."

Partial list of Exhibitors at the Automotive and Accessories Exhibition.

Arrow Grip Manufacturing Co., Glenn Falls, N. Y.; Carborundum Company, Niagara Falls, N. Y.; Essenkay Products Co., Chicago, Ill.; A. W. Shaw Co., Chicago, Ill.; System on the Farm, Chicago Ill.; Twin City Varnish Co., St. Paul, Minn.; H. G. Paro Co., Chicago, Ill.; EKern Bros. Mfg. Co., Flandreau, S. Dak.; Automotive Accessories Co., Baltimore, Md.; Perfex Radiator Co., Racine, Wis.; New Lite Lens Co., Chicago, Ill.; U. S. Auto Supply Co., Chicago, Ill.; Brown and Caine, Inc., Chicago, Ill.; Metal Specialties Mfg. Co., Chicago, Ill.; Geo. D. Bailey Co., Chicago, Ill.; Jefferson Electric Mfg. Co., Chicago, Ill.; Atlas Specialty Mfg. Co., Chicago, Ill.; The Reliance Co., Chicago, Ill.; Harry Newman, Chicago, Ill.; Advance Accessories Corp., Chicago, Ill.; Bailey Non Stall Differential Corp., Chicago, Ill.; The Zinke Co., Chicago, Ill.; Milwaukee Auto Engine & Supply Co., Milwaukee, Wis.; Shurnuff Mfg. Co., St. Louis, Mo.; Romort Mfg. Co.,

Oil Co., Council Bluff, Iowa; Agrimotor, Chicago, Ill.; Falls Motor Corp., Sheboygan Falls, Wis.; Buller Coupler Sales Co., Madison, Wis.; Orange Judd Co., Chicago, Ill.; White Star Refining Co., Detroit, Mich.; American Manganese Steel Co., Chicago, Ill.; LaCrosse Tractor Co., La Crosse, Wis.; Hooven Radiator Co., Chicago, Ill.; Electric Steel Truss Wheel Co., Kankakee, Ill.; Guaranteed Tractor Corp., Chicago, Ill.; One Wheel Truck Co., St. Louis, Mo.; Traffic Motor Truck Corp., St. Louis, Mo.; Winther Motor Truck Co., Winthrop Harbor, Ill.; Hudford Co., Chicago, Ill.; Mechanical Belt Co., St. Joseph, Mo.; K & D Lamp Co., Cincinnati, Ohio; New Era Specialty Co., Grand Rapids, Mich.; Eclipse Valve Grinder Co., Kansas City, Mo.; Link Belt Co., Chicago, Ill.; Harding & Co., Chicago, Ill.; Anderson Electric Specialty Co., Chicago, Ill.; Atlas Auto Supply Co., Chicago, Ill.; N. A. Petry Company, Philadelphia, Pa.; Reflex Ignition Co., Cleveland, Ohio.; Gray-Heath Co., Chicago, Ill.; Nilson Tractor Co., Minneapolis, Minn.; Hoosier Auto Parts Co., Muncie, Ind.; A B & B Specialty Co., Milwaukee, Wis.; Milwaukee Forge Machinery Co., Milwaukee Wis.; Higgins Springs & Axle Co., Racine, Wis.; S K F Ball Bearing Co., Hartford Conn.; Forschler Motor Truck Mfg. Co., New Orleans, La.; Sumter Division, Splittorf Elect. Co., Chicago, Ill.; Commercial Truckmobile Co., Chicago, Ill.

The products of the following Companies will be exhibited by the Gray-Heath Co.,

FINDING BROKEN WIRE.

It is a difficult matter to locate a broken wire in an ignition cable unless one knows how. Here is how: Draw each individual wire out somewhere along the cable. Hold a compass within a half inch of the wire. If the current is flowing through the wire, the compass will be deflected from its normal position in one way or the other. A broken wire will have no effect on the instrument, which thereby acts as detective.

ALIGNMENT TEST.

A rough and ready method of testing the alignment of the front wheels is to jack these wheels up an equal distance from the ground and spin them. While they are revolving draw a line on the outer of the tires with a piece of chalk, measure the distance from the line on one tire to the corresponding line on the other tire at the heights of the hubs and both before and behind the front axle. The approved gage will work out at about three-eighths of an inch.

About Horseshoes and Luck

WILLIAM PAUL LANGREICH

IF you were a "regler feller" before dad sanctioned long pants, you'll know just what Spike enlightened me as to horseshoes and the luck attached to them. You'll remember your "Spike," who boasted of handling frogs with no fear of warts, 'cause he handled a horseshoe back home just afore going to bed each night."

And speaking of horseshoes,—I bought one from the Smithy's son



"IF I EVER FAILED TO ATTAIN MY AMBITION OF DRIVING A HEARSE—I'D BECOME A BLACKSMITH."

for three cents. That meant three successive days of Hooverizing on my favorites—lemon balls,—but it was worth it. I sneaked that chunk of iron home and it worked like a charm. Even when dad found it he didn't scold me. Instead, he suggested nailing it over the door.

But if just one little shoe meant so much to me, thought I, how does the blacksmith fare with all of those shoes around his shop? Spike told me that's why he never gets his finger under the sledge, and for the same reason, was never burned by the red hot bars he thrust into the fire. Sure, they meant loads of luck to him.

And that is why I spent so many hours before the Smithy's shop, I'd lean against the old tree—(not a chestnut—an oak) and chew my lemon balls until it was time to go home and run the errands for dinner. Indeed, I determined that if I ever failed in my one ambition—to become the driver of a hearse,—I'd resort to horseshoeing.

That was some time ago, and things have changed. I'm pushing a pen for a man who hands me a

little envelope at one o'clock every Saturday. Hearses are guided by chauffeurs instead of fellows in long black coats who held the reins in that graceful manner. The farm I lived on has changed too. A tractor draws a gang of plows over the fields and later in the season, the same tractor drags cultivators and then harvesting machines. But one thing remains—the Smithy. I blame it all on those horseshoes, for he still has a heap of rusty ones in the corner of his shop. But he never uses them. In fact, he hasn't shod a horse for weeks. And the sign—the one we used to pelt with snow balls—has been reworded. Instead of "horseshoeing," it reads "Auto and Tractor Repairs." And a mighty man is Smithy, for he not only supersedes himself, but the veterinarian and the feed merchant. Out in front, where the tree used to stand, is a bright red gasoline pump. The windows are washed so that you can see right through them, and gaze upon a pyramid of tires. In fact I would say he's a changed man, but for one fact. On the last census day, Smithy gave his name and then, alas, his occupation as "blacksmith."

"No new fangled titles for me. I used to fix up horses, and now I do the same to the iron horses. When the Jones' tractor breaks down, I take my welding plant over in the flivver and she's fixed. Nope, I'm not a garage owner nor a regular chauffeur, I'm a plain blacksmith who just has to keep up with the times."

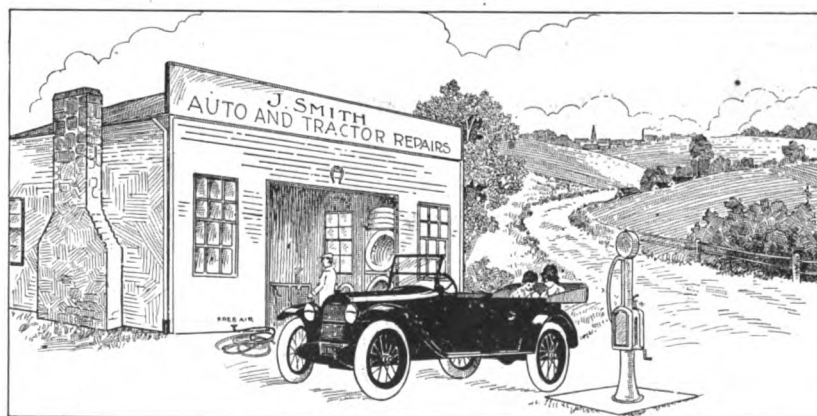
And here is my old Smithy—still a blacksmith. He still commands my respect. His shop still attracts me. And yet—he is but one transformed Smithy—one of the thousands who are "just plain blacksmiths who have to keep up with the times."

DECLUTCHING AT CORNERS

While it is a wise precaution to throw out the clutch when rounding a sharp corner, it also has a beneficial effect upon the tires. Whenever the car tends to skid, due to its deflection from a straight course, a cross strain is brought to bear on the tire treads, which is directly proportioned to the weight of the vehicle and the radius of the curve and proportioned to the square of its velocity. If the power is applied in rounding a curve the tendency to rip off the tires is further aggravated by the backward drag due to traction. If the clutch is released, however, that factor is eliminated and the strain is thereby reduced.

CARING FOR HUB CAPS

When putting the car in commission for the year and every month during the running season, the hub caps should be thoroughly cleaned out, all the grease and verdigris removed, after which the caps should be repacked with fresh grease. It is also well to clean out the hubs and bearings, washing them thoroughly with gasoline so that dirt and grit will be dislodged. When this has been done the moving parts should be again lubricated, the hub caps put back in place and the car can be driven without fear of improperly lubricated axles.



"OUT IN FRONT WHERE THE TREE USED TO STAND IS A BRIGHT RED GASOLINE PUMP."

LEGAL CONSIDERATIONS IN RELATION TO MODERN ACCOUNTING METHODS

RALPH H. BUTZ

Notes

IT FREQUENTLY happens that the business man is not conversant with modern methods of accounting, and as a result he does not keep a proper record on his books of the Notes Receivable and Notes Payable. The entries for these items are not neglected because he is of the opinion that it is not necessary to keep a record of them, but rather because he is undecided as to how these records should be kept. He realizes that his notes receivable are an asset and should therefore be included among the listed assets on his balance sheet or financial statement. He also knows that the notes payable are a liability and should be listed as such on the balance sheet.

One business man who always has a number of notes on hand makes no entry for them on his books, but keeps them in the safe until the date of maturity. When a note is paid he then credits the open account on the ledger, which had not received the proper credit at the time the note was received in payment. When a note is paid in part only and a renewal note is received for the balance due, he then credits the open account with the amount of cash received in part payment of the matured note. In this manner the open accounts do not receive the full credit until the notes have been paid. As a result of this policy his financial statement does not show the exact status of his assets. He usually has on hand notes for approximately one-fourth of the

amount which he lists as Accounts Receivable.

A note is a higher form of indebtedness than an open account, for the note itself is evidence of the amount due. In suing on an open account, however, it is necessary to prove the correctness of all the items that make up the account. A note is also paid more promptly than an open account. For this reason the financial statement will make a better showing when the Notes Receivable are listed separately instead of including these items with the Accounts Receivable.

Another manager who discounts all his notes receivable has evolved the simple method of crediting the maker of the note with the face value in the cash book, and charging interest on the disbursement side of the cash book with the amount of discount charged by the bank, thus keeping his cash account in balance. In this manner the customer's open account receives the proper credit, but the books do not show the total amount of notes under discount at the bank. Such an account should be kept for discounted notes, because when a note is discounted a contingent liability is created. Such a liability should not be confused with notes payable. A note payable is a direct or positive liability, while a note receivable discounted creates a secondary or contingent liability, due to the fact that the maker of the note may not be able to provide for its payment at maturity. This will make the person who discounted it responsible for its payment to the bank.

Thus it will be realized that many men have their own peculiar methods of recording note transactions,

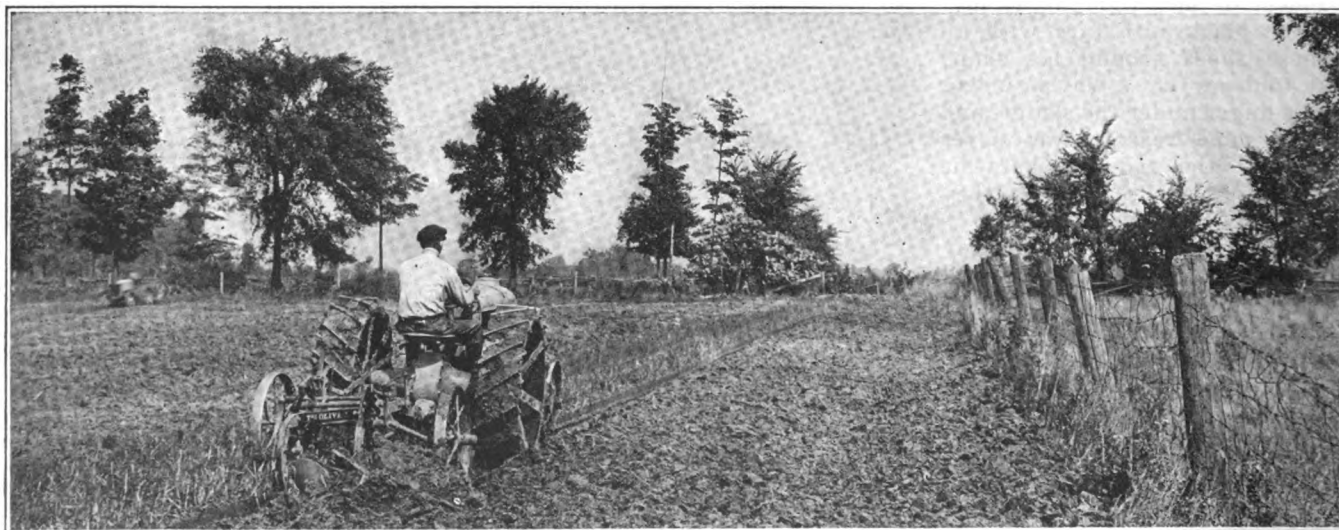
which, while very simple, are not in agreement with good or approved accounting principles. The reason for this wide divergence in book-keeping systems can be understood more readily when it is known that the average business man's training and experience have been along lines of salesmanship, rather than along accounting lines. However, at the present time there is a universal demand among business and trade organizations for uniform systems of accounting, and there are many business men who will be interested in knowing how to keep these accounts in accordance with the methods recommended by accountants.

Assuming the business man's name to be John Jones, we will treat the transactions from his point of view. In this manner the reader will be able to apply the principles here given as though he were in the same position.

John Jones sells to Henry Sutter a quantity of material for which Mr. Sutter agrees to pay with a note for \$500, due two months after date. This note is a written promise to pay at a certain future date. It is a note payable on the books of Henry Sutter, and a note receivable on the books of John Jones. As soon as Jones receives this note he credits Henry Sutter's open account with the face value, having previously charged this account with the value of the material sold. Such a credit will be in the form of the following journal entry:

Dr. Notes Receivable	\$500.
Cr. Henry Sutter	\$500.

John Jones' ledger now shows that he has in his possession a note which he received in payment of an



"IT DOESN'T CARE A WHOOP FOR FLIES—IT NEVER TIRES OF EXERCISE." COMPLETE FORDSON TRACTOR AND OLIVER TWO BOTTOM PLOW THAT CONSTITUTES THE REGULATION OUTFIT.

open account. It also shows that this part of his assets has been converted from the non-liquid form of an open account into the liquid form of a note receivable.

John Jones also finds that he is in need of funds with which to pay several invoices; so he decides to have the note discounted at his bank. The bank discounts the note and informs Jones that the proceeds, \$495, have been entered to the credit of his bank account.

This is another transaction and requires a separate entry. Before making the entry it is necessary to consider this transaction in detail. John Jones' first impression might be that since the note is no longer in his possession, all that he will need to do is to credit notes receivable in the cash book with the amount of the note, and charge Interest account with the amount of interest charged by the bank. Such an entry would be evidence that the note had been paid, which is not the case. While the note is no longer in his possession, nevertheless his liability does not cease until the note has been paid. The bank has merely loaned Jones the money and holds the note until it is paid in order to secure the loan. Mr. Jones is in fact still the owner of the note, and the fact that the bank has loaned him money on it signifies that he has thereby created a secondary liability. This liability should be shown on the books, as evidenced by the following journal entry:

Dr. Cash in Bank\$495.00
Dr. Interest & Discount .. 5.00
Cr. National Bank (Disct. Acct.) \$500.00

The total of the National Bank Discount Account should at all times show the total amount of notes under discount. When notes are discounted at more than one bank a separate account should be kept for each bank.

When Henry Sutter's note matures and is paid by him, then John Jones will make the following journal entry, which will remove this item from the assets and also from the contingent liabilities.

Dr. National Bank (Disct. Acct.) ..\$500.
Cr. Notes Receivable\$500.

If the entries are made in the proper order for all note transactions the ledger will at all times show the exact amount of contingent liabilities for which John Jones may be held responsible, should his customers default in the payment of their notes. If these accounts are not kept the financial statement will not disclose the true facts concern-

ing the financial status of the business.

Should Henry Sutter fail to make payment at maturity, the bank will then charge the amount of the unpaid note to John Jones' account and look to him for payment. In such a contingency Jones' journal entry will be as follows:

Dr. Henry Sutter\$500.
Cr. Cash in Bank\$500.

In this manner Henry Sutter's open account will then be charged with the amount of the unpaid note. If John Jones files suit for payment, such action will not be to recover for the original bill of material, but for payment of the note, as the note is evidence of the amount due and needs no supporting data.

There is a supposition that notes may be termed as either Notes or Bills. This is an erroneous idea. There is a difference between Notes Receivable and Bills Receivable. On Jones' ledger the term, Bills Receivable, will be used to designate the bills he has rendered to customers for purchases made from him.

Trade Acceptances are also classed as notes in the accounts and the entries for these are made in the same manner.

Notes Payable

John Jones owes Wood and Company \$800. He has made arrangements whereby this firm agrees to accept his promissory note at two months in payment of the account. When Jones issues the note he makes the following journal entry:

Dr. Wood and Company\$800.
Cr. Notes Payable\$800.

As this is a positive or direct liability no other entry is required, which would not be the case with a Note Receivable discounted. This entry will show that the amount has been transferred from one liability account to another. A note payable is a higher form of liability than an account payable. When Jones pays this note at maturity the following journal will be required:

Dr. Notes Payable\$800.
Cr. Cash in Bank\$800.

Should Jones have occasion to discount his own note payable at the bank, the entry for such a transaction would be:

Dr. Cash in Bank.
Dr. Interest & Discount.
Cr. Notes Payable.

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Automobiles were not admitted to Central Park New York, in the early days. Winslow E. Buzby was arrested on October 31, 1899, for endeavoring to drive a "horseless carriage" in that famous playground.

SLIPPING CLUTCH.

When the clutch starts to slip, many drivers make the mistake of racing the engine in the expectation that the car will move faster. The proper way to handle the slipping clutch is to operate the engine slowly with little change of speed, in the hope that the flywheel will catch and carry the clutch around. Racing the engine makes matters worse, for the clutch gets no chance to hold and there is the chance that it may be burned out altogether.

HANDY MAGNET.

Only the man who has tried knows how hard it is on some occasions to remove particles of metal that have lodged in various parts of the mechanism. Broken gear teeth lodged in the transmission case, may be instanced. Almost everyone knows that a magnet may be used for this work, but often the magnet is so shaped that it will not reach into certain inaccessible parts of the mechanism. By wrapping a twelve inch bar of cold rolled steel having a nut run on the lower end, with three or four layers of No. 20 magnet wire, connected up with a six volt storage battery or three or four dry cells, a magnet is made that will lift a really heavy piece of iron and will go in almost any part of the mechanism, no matter how inaccessible.

A HANDY "KINK"

When you have need of a pipe wrench, and one is not at hand, a substitute can be procured by using an ordinary wrench which has jaws wide enough to let you slip a plain file between the pipe and spanner jaws. Pressure on the wrench binds the file against the pipe surface, giving a grip sufficient for all ordinary purposes.

EMERGENCY CARBON BRUSHES.

The ordinary pocket lamp battery, when exhausted is still useful for the small carbon rods it contains, which can be filed and trimmed up to serve temporarily to replace worn-out carbon brushes in a magneto. Lighting dynamo brushes are usually of rectangular section, and replacements can often be devised from an old carbon plate of a worn-out dry cell or exhausted Leclanche' cell by breaking the porous pot. The carbon can be easily sawed and filed.

THE BACK NUMBER AND THE OPPORTUNITY GRABBER

Old Timon T. Tinker, a blacksmith, I neighbored, for forty-eight years at the anvil had labored. He knew all the ins and the outs of the trade and a comfortable living and money had made. He knew all the wagons and horses around and could tell who was coming up the road by the sound. His wagons and carts were built of best stock; they stood up to wear like an ocean swept rock. He knew all there was to know of his craft from the fittings to Dobbin or the repairs for a shaft.

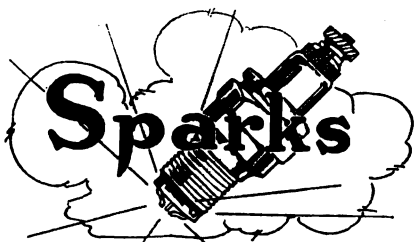
But Timon T. Tinker was set in his ways and figured old methods would do in these days. When asked if he'd fix up a spark plug or tire, he'd rip, roar and snort and rise in his ire, to pan the guy proper with nerve so colossal to ask him to touch a mere auto-the fossil! He damned all the motor pulled wagons on earth and at autos and tractors he poked fun and mirth—said gasoline buggies and tractors and such "air traps of the devil and ain't worth very much. There ain't no machine in heaven or hell that'll take up the place by the horse filled so well."

So Timon T. Tinker kept pounding out junk, but his business kept going till his credit was punk. His former contentment skipped out of the coop. His knees got unsteady and his shoulders now stoop. His former fat wallet is thin as a bat and folks seldom come now with work or to chat. Folks don't want to trade with a back numbered skate, but seek out the chaps who are right up to date.

Young Silas McSwanson, a bicycle had—'twas not very good nor yet very bad. He tinkered and tampered from morning to night, a tryin' to get that old bike to go right. Then one day while tinkering, a thought hit Si's thinker,—"Twas surely ambitious for just a mere tinker. He said as he turned up a nut on a spoke—"As a clever mechanic I may a joke but brains are the thing if you put them to use, in fact it's a shame to let good brains run loose. I'm wiser than most of the chaps in the town; I'll open a shop and pull some kale down."

And so our hero, Young Si, took a lease on Gordon's old livery down the road just a piece. He cleaned up the place with whitewash and paint and made that old barn look like what it ain't. The signs big and yellow he put on the place were glaringly lettered and spoke face to face. All within hearing could read at a glance that Si was an expert on motoring plants. That motors and autos and tractors and such were to most folks intricate but to Si not so much.

The equipment Si had you could count on your thumb and what there was of it was poor—rather bum. His mechanical knowledge you know was so lean that oiling a bicycle would trouble his bean. But bluffing was just where young Si was t'home and believe me he bluffed from his feet to his dome. His auto repair shop—the first one in town—just prospered and prospered and grew in renown, 'til sections and acres were added and built for work just crowded his place to the hilt. Today Si is rich as Croesus B. C., a glaring example of successful O. G. (Opportunity Grabber.)



New babies these days should be just the fashion—they are such red, cross affairs.

This month will see a lot of men employed at some useful occupation who never did much before besides running the country.

If you can build a battleship or raise a hog in these days don't keep any woolly dogs.

If as seems possible, the draft age is raised to forty-five, maybe some of these cheery old earthworms who have been annoying you to death about their deep regret at being too old to get in the army will shut up."

Don't fight with your wife—join the marines; they get paid for it.

It doesn't make a lightweight any heavier to put on airs.

It's all right to cultivate a fad but a war garden is more practical.

Charity may begin at home but that fact shouldn't affect its ultimate destination.

Competition may be the life of trade but government control brooks no competition.

It is better to be known as a jack of all trades than to specialize as a trouble maker.

We saw the French Blue Devils in Buffalo a few days ago but we'd rather see them in Berlin.

The glutton doesn't care so much about the fit of his clothes if his dinner fits his appetite.

The fellow who is afraid to take a chance may give as an excuse that he never has a chance to take it.

Now that we happen to think of it what has become of our two old friends Lenine and Trotsky?

With the present transportation facilities it isn't wise to express an opinion without marking it "handle with care."

There are a lot of railroad presidents who will agree that Mr. McAdoo is something of a railroad fireman.

Now that the Quakers have endorsed the war what kind of an excuse will the "conscientious objectors" have to offer in their wild panic to avoid military service? And at that one wonders whether it is conscience or cowardice.

It is doubtful if the Heidelberg college students are still spilling their iron blood in duels in broadsword combats nowadays. Before the war ends the scars most of them have won't adorn their faces. Far from it!

Mister Hoover sure has some funny ideas on war economy when he tells the folks to stop eating beef at 30 cents a pound and eat pork at 40 cents.

It seems that Leonard Wood but they won't let him.

At last Uncle Sam has rubbed lard in his hair, made big medicine and set out to bring home the scalps of a few war contract profiteers and grafters.

It is evident to every thinking man that our industries on the farms, in the shipyards, in the mines, in the factories

must be more prolific and more efficient than ever." Woodrow Willson.

From where we stand now it looks as though the Third Liberty Bond drive was more of a success than the big German drive.

If you know any soldiers "Over there" write to them and tell them the news from home. They will appreciate it and be glad to hear from you but they won't appreciate hearing your troubles or the troubles that you imagine you have—write cheerful letters for much depends on keeping our soldiers satisfied and contented.

Abe Martin tells us "That the more cigarettes cost the more they smell like a hot lead pencil eraser."

The fellow who is looking for trouble generally looks through the bottom of a whisky glass.

The patriot's first commandment: "Eat what you can get and be content that you are able to get it."

General Crowder's mandate of "fight or work" will make it possible for some men to make a living for their families.

The fellow who skates over thin ice discovers that it isn't all it's cracked up to be.

Among the many things that are weighed in the balances and found wanting are most of the fish stories.

In England they say, "Every shilling wasted stabs a soldier in the back."

It is not enough to deplore what the Germans have done. That will not hurt the Germans; they don't care what you think of them. Help your Government to fight them. That is the only thing that counts with a German. When you save and buy War Savings Stamps you attack a German in the place where it hurts.

If you actually knew that by buying only those things you absolutely needed and by putting your savings into War Savings Stamps you could save lives, would you do it? Take the word of the President that you do save lives when you do this.

Everyone knows best how he can reduce his expenses so that he may have more savings with which to buy War Savings Stamps.

Pro-Germans probably think the War Savings Campaign a foolish one.

There's only one "yellow peril" in this country and the draft boards know how to handle him.

We have a fool idea that if the allies would paint beer signs on the hospitals close to the war zone that the Germans wouldn't be so enthusiastic about bombing them.

"Of all sad words of tongue or pen, The saddest are these: 'It might have been'"

But one small phrase annuls the curse, And that is this: It Might Have Been Worse."

You are aged thirty but once.

Better lay in your supply of rattlesnake venom now. The price is going to jump from \$5 to \$10 an ounce.

The idea of shipping bootleg whiskey into dry territory in coffins is a practice to be commended. The same men who drink the whiskey can use the coffins, thus killing two birds with one stone.

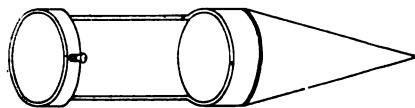
One good turn deserves another and generally gets it—in the neck.

Even the man who is too old to fight may stay home and get married.

It takes cold cash to carry on a war. Don't let it burn a hole in your pocket.

SOLDERING IRON FOR GASOLINE TORCH

The illustration shows a soldering iron that can be attached to the gasoline blow torch and is a particularly valuable little helper when



BLOW TORCH SOLDERING IRON.

any great amount of soldering is necessary.

The end is made of a piece of solid copper, either ground or forged into shape and hollowed out as desired by drilling. The holder that attaches to the blow torch is made of a piece of one inch pipe and provided with a set screw as shown. This same arrangement can be made of a piece of inch pipe although it will be necessary to draw out the end of the pipe to a point.

James M. Purcell.

TO LUBRICATE SPRING LEAVES.

When it is necessary to insert lubricant between the leaves of the springs, release the clips and stay bolts and jack up the frame, so that the weight of the car is removed from the spring being treated. This spreads the leaves just enough to allow the lubricant to be inserted and yet does not injure the parts, as hammering them open with a cold chisel is likely to do.

SAVING THE BOLT THREAD.

In drilling a hole through a bolt, so as to make it possible to use a cotterpin, it frequently happens that the threads are injured, so that it is difficult to put the nut on. This may be obviated by first running the nut well up on the bolt and then drilling the hole for the cotter pin. After the hole is made back the nut off and in passing over the place operated on the nut will restore the thread. This applies also to sawing or cutting off a bolt, which is likely similarly to injure the threads.

Benton's Recipes



Satin Finish on Aluminum.

The article should first be dipped in a caustic soda or caustic potash solution—potash preferred—then thoroughly washed in clear water and dipped in a bath of concentrated nitric acid, after which it should be thoroughly washed and dried in hot sawdust. The caustic solution should be prepared in a tank provided with a steam coil and should test with Baumes' hydrometer at anywhere between 20 and 30. The length of time an article should remain in the caustic solution is a matter of judgment. The solution should attack the aluminum rapidly, and upon removing the article from the solution, the solution should boil furiously on the metal. After washing, the article should show a very black color, which turns to a silvery white finish upon dipping in the nitric acid. The best temperature for the caustic solution is at 200 degrees F., just below the boiling point. By the use of a steam coil the solution can be kept at an even temperature, and the strength of the solution can be maintained by adding small quantities of caustic from time to time. The temperature and strength of the solution are very important.

The principal point to bear in mind in washing and drying is to dry without streaks, which is accomplished if the sawdust contains no pitch or rosin.

This finish can be improved by scratch-brushing the article before dipping or by first dipping in the two solutions and then scratch-brushing and afterward dipping again. The scratch-brushing destroys the grain of the metal and reduces the possibility of the article drying with streaks.

Solder for small parts.—To make a solder for small metal articles cut tinfoil into the shape wanted and wet on both sides with sal-ammoniac. Have the surface of the piece clean place on it the wet tinfoil and then press the parts together firmly and heat until the tin-foil is melted.

Whiting Surfaces for Laying out Work.

For laying out work on structural iron or castings a better way than chalking the surface is to mix whiting with benzine or gasoline to the consistency of paint, and then paint it with a brush; in a few minutes the benzine or gasoline will evaporate, leaving a white surface ready to scribe lines on.

Soldering Galvanized Iron.—For soldering galvanized iron without scraping use raw muriatic acid.

Soldering Kink.—When soldering, and no acid is handy, a common tallow candle will answer the purpose.

Testing Solder.—To test solder to learn whether it is of good quality, hold it up near the ear and bend it. If it cringes or makes a crackling noise, it is good. If not, it is poor, having too much lead and not enough tin in the composition.

Shellac Cement.—Shellac is the basis of most adhesive cements. A good one is made by thickening shellac varnish (shellac dissolved in alcohol), with dry white lead, mixing the two with a putty knife on a piece of glass.

Tinning Wash for Brass Work.—To prepare a tinning wash for brass work, use 8 pounds of white argil (potter's clay), 4 gallons of soft water, and 8 pounds tin shavings. Boil the brass work in this solution for 15 or 20 minutes.



HE DOESN'T SHOE MULES ANY MORE OR MEND THE ONE HOSS SHAY

—Buffalo News

All Sorts of Tractors Doing all Sorts of Work



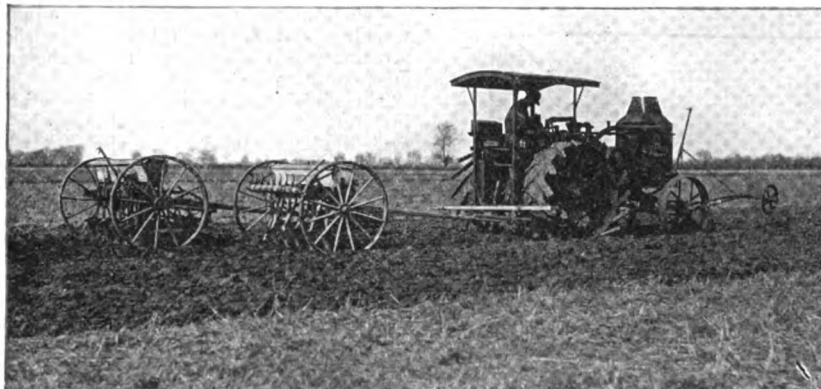
THE TRACTOR MAKES POSSIBLE THE CULTIVATION OF LARGE AREAS OF LAND.



THE ONE MAN GARDEN TRACTOR



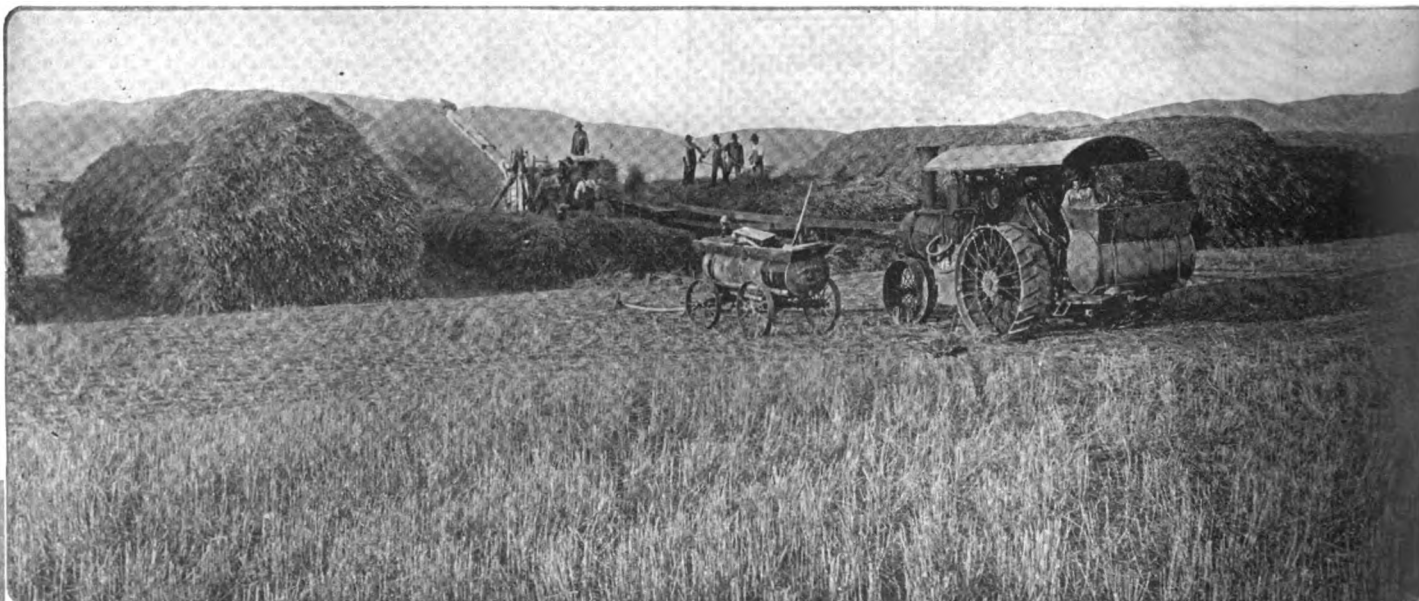
THE TRACTOR SOWS THE SEED FOR AMERICA'S CROPS



THE TRACTOR SOWS THE SEED FOR AMERICA'S CROPS



DISCING UNDER THE LOW BRANCHES OF THE ORCHARD



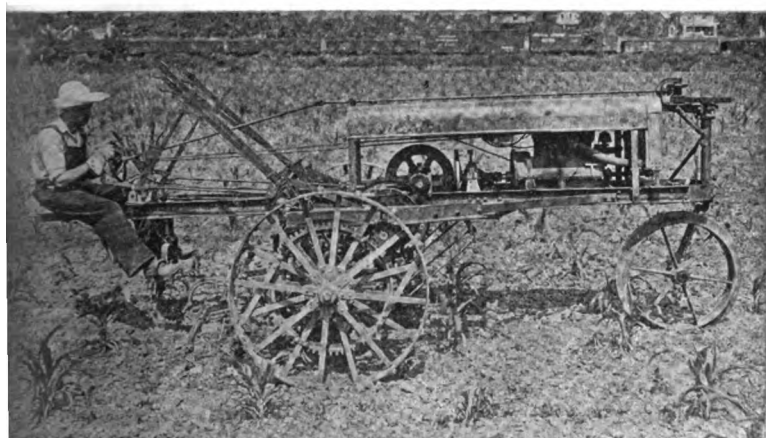
THE STEAM TRACTION ENGINE IS STILL LARGELY USED BUT IS BEING GRADUALLY DRIVEN OUT BY THE GAS TRACTOR



CONTRAST THIS WITH THE HORSE DRAWN METHOD



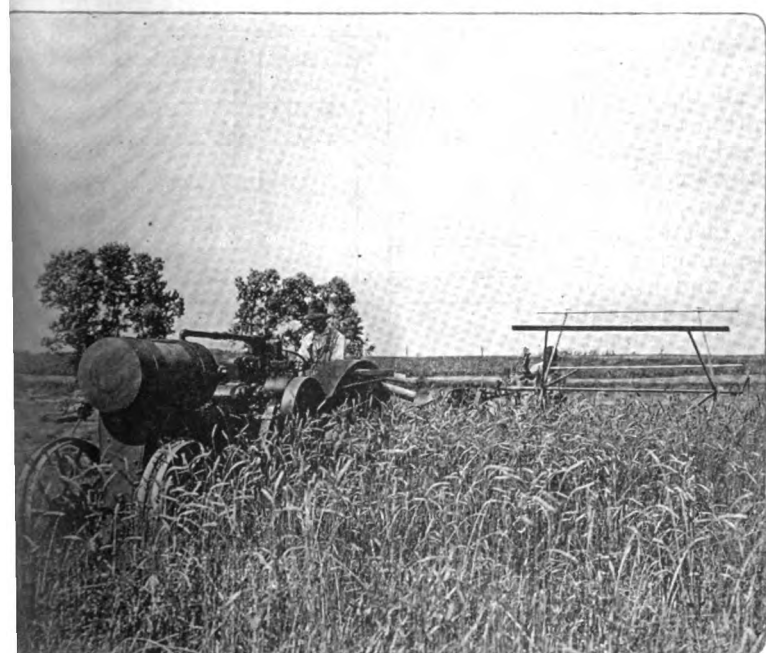
**TRACTOR EQUIPPED FOR BREAKING UP SUGAR
CANE STUBBLE.**



SPECIALLY BUILT FOR CULTIVATING



CUTTING ENSILAGE AND FILLING THE SILO



THE TRACTOR DRAWN REAPER AND BINDER



HAULING TWO WAGONS EQUIPPED WITH LOADERS

Knocks

How to Locate and Remedy Some of the More Important Ones

J. N. BAGLEY

ONE of the things that will annoy the motorist more than any other thing is a knock about the motor or some of the gearing in the rear assembly. Knocks about the engine are a great deal more dangerous than about the chassis of the car for in nearly every instance the knock in the engine results in a general smash up and quite a little expense if neglected. The old, experienced driver has learned this from ex-

perience while the novice has it to learn. Many of us can remember quite well the old two cylinder engine with the long stroke, and how it would knock but a little while before the bearing went out leaving the rod proper to pound on the bearing of the polished crank shaft. The stroke being long and the piston heavy it was but a short time that it would withstand the terrific strain it was subjected to. One of the first things we would do when the rod came down was to "get out and get under" and take a look to see what had happened to the crank case, for usually it cleaned the bottom out entirely, the next thing in order was to invoice the ready cash to see if we could make the necessary repair. A repair of this kind was usually rather expensive

LOCATING THE VARIOUS KNOCKS.

There is not a single knock that develops in the motor car of to-day that the experienced mechanic and driver will not locate in a very short time, and in most cases before any great amount of damage is done. There are many knocks that may appear, or develop from time to time, but they each have a different sound when one understands the car he drives. There are but two knocks that have a very close resemblance, so to speak; the wrist pin knock and the carbon knock. Both of the knocks are but a sharp rattle with a slight echo sounding very much like the tapping of a piece of steel about four inches long with a small bar. These are by no means the dangerous knocks as we shall see as we go on down the line, but they are injurious to the engine as we will find later.

The connecting rod knock has a distinct sound of its own and can be singled out from all the rest in a very short time after becoming accustomed to the various knocks. This is rather a heavy knock and comes at regular intervals, whether the motor is running fast or slow. When the engine is laboring the knock becomes louder and heavier but as the load is lightened it will knock more lightly. The connecting rod knock comes at the end of the working stroke as the shaft whirls to carry the piston back on its upward travel to the highest point. As the shaft is turning over the top position the explosion takes place and the ignited charge of gas forces it back down and again it turns on its upward position and each time this operation takes place a knock is heard. It is the sudden jerk on the piston that thrashes out the loose bearing and plays

"hob" with things in general. As soon as the bearing metal is thrashed out, the distance the shaft travels in the bearing is increased until the connecting rod bolts are broken by the excessive strain in a very short time, and even though the bolts withhold the strain, the polished bearing surface on the crank shaft will be roughed until it will take a great deal of labor and pains to restore it to its normal smoothness.

THE MAIN BEARING KNOCK.

The main bearing knock is a deep heavy knock, as compared to the connecting rod knock, and unless the bearing is very loose, it will only develop when the car is "drifting" with the clutch engaged and the engine laboring very lightly on a down grade. We mean by drifting, speeding the car up to say 30 miles to the hour and closing the throttle and allowing the momentum of the car to revolve the motor crank shaft. This operation also

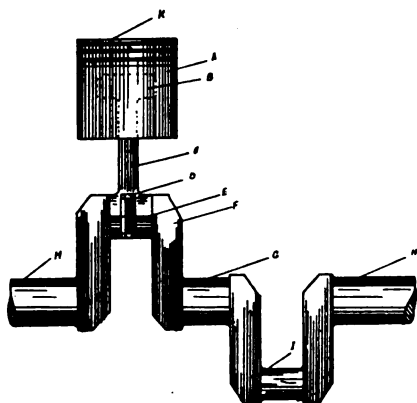


Fig. 1.

WHERE CRANK AND PISTON KNOCKS SHOW UP

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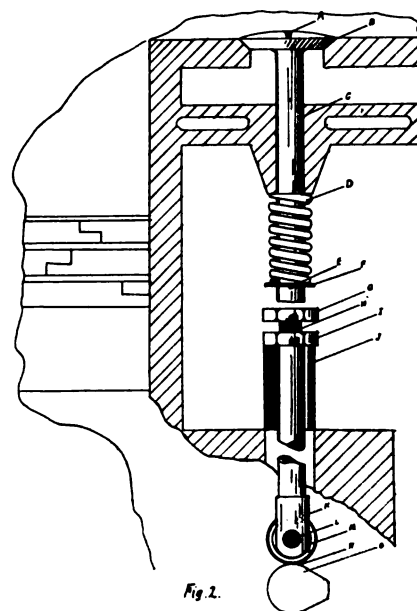


Fig. 2.

IMPROPERLY ADJUSTED VALVE MECHANISMS ARE RESPONSIBLE FOR SOME STRANGE AND ANNOYING SOUNDS.

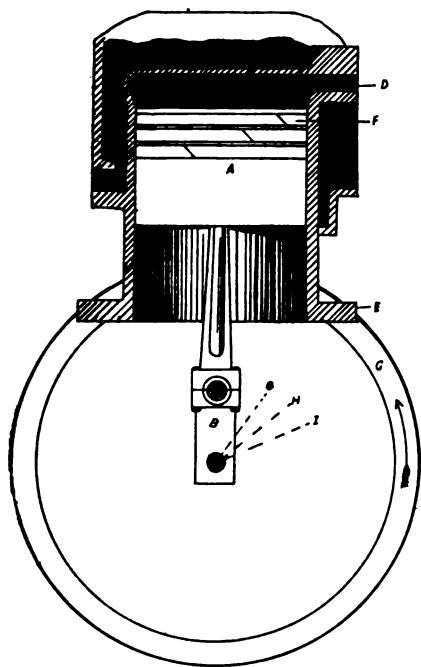


Fig. 3.

THE CARBON KNOCK IS ANOTHER OF THE BREED AND THIS EXPLAINS IT.

will many times locate a looseness in the connecting rod bearings. The main bearing knock is not as dangerous as the connecting rod, but it by no means should be tolerated as it is injurious to the motor. Many times a crank bearing being loose will cause a shaft to be cracked at some point and after it has been run many weeks will break with no apparent cause, with the engine running idle.

There are usually three or more of the main bearings and the chances are that only one of them will be loose at a time, consequently as the shaft is allowed to spring it is liable to crack.

THE FLY WHEEL KNOCK.

The fly wheel knock, as we call it, comes from the fly wheel being loose on the crank shaft and can be distinguished from all other knocks by its heavy metallic knock. This should not be allowed to continue for it will be but a very short time until the inner hub surface bearing on the shaft will be ruined to such an extent that it can never be kept tight again. In case the hub is straight, the key holding it to place should be replaced with a new one fitting perfectly, and, on the other hand, if it is a taper hub, care must be taken that the Whitney key fits snug, and that the nut is made secure and well keyed after tightening, or it will be but a short

time until it will be working the second time on the shaft.

THE BEVEL PINION KNOCK

"Now who ever heard of bevel pinion knock?" remarked a customer one day after I had taken a little ride with him to diagnose the trouble. So in this case it was necessary to explain to him that a knock could be in the gears as well as any part of the car. We opened up the rear axle housing and washed out the gears and removed the bit of steel that had found its way to the bevel ring, or master gear as some prefer to call it, but at any rate it was there and every time the small bevel pinion would pass over it there would be a knock that, to the inexperienced, would be hard to locate, for at times it would sound one place and at times another. This should be removed at once for the gears are meshed very closely and each time the small gear comes up to this obstacle it must spring either the master gear to allow of the small gear passing by or the bearing must give sufficiently to allow it to pass over, at any rate it is injurious to the rear axle construction and should not be allowed to run longer than necessary.

We then have a number of little knocks about the car that come from time to time that are the minor ones and are not dangerous to any great extent but these should be cared for in the same careful way as all the rest of them for where there is a knock there will be found quite a little looseness. The universal joints, spring shackles, engine or transmission loose on the frame, radius rods loose, dash loose, body not securely fastened down and many other little things that demand the attention of the owner of the motor car. Now that we have mentioned the knocks that will be found from time to time we will go over the list and dwell a little time on making the necessary repair in a purely practical manner in plain, understandable language.

In Fig. 1, we have a drawing of a crank shaft with the piston attached by means of the connecting rod. At H, H, we have the end main bearings that are liable to become loose from wear and the point G, we have the center gearing. In case the end bearings are tight and the center bearing loose, at each revolution of the shaft, the shaft will spring and soon wear the bearing out of line. In this case it will be necessary to remove the shaft from

the engine frame and place a straight shaft into the bearings and not if the bearings are in perfect alignment. In case they are not it will be necessary to scrape the metal from the high ones until they are in alignment. Next in order will be the fitting of the bearing to the shaft. Begin at either end of the shaft and tighten the bearings one at a time until a perfect working fit is obtained, after which tighten them all down to a tight fit and note the shaft to see if it works free. In case it does, it will be but necessary to key all the nuts and prepare to adjust the connecting rods to the crank bearings. This can be done by removing shims E, from the rod until when the bolts D, are tight the weight of piston A, will just slowly drag the rod down. Adjust the rods remaining in a like manner and key them all securely being careful that none of the connecting rod bolts are over strained in tightening. In case there is a little looseness in the upper bearing at B, indicated by the dotted lines, replace the bearing with a new one and a new pin if necessary. At K, we have the point where the carbon accumulates and it should be removed from time to time as it causes pre-ignition. We mean by pre-

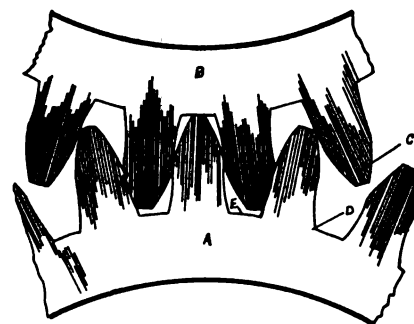


Fig. 4.

BADLY WORN AND BROKEN TIMING GEARS ARE RESPONSIBLE FOR A LOT OF UNNECESSARY NOISE AND IF YOU WILL READ ON, OTHER TROUBLES BESIDES.

ignition the ignition of the charge of gas in the combustion chamber before the piston has reached the correct position. In case the bearing at I, is roughed from the bearing surface grating upon it it will be necessary to polish it again before replacing the new bearing. To do this place a small piece of fine emery cloth around the shaft and place a small leather strap around this once and a half and draw it back and forth until the bearing surface is smoothed up in good shape, after which

place a little rotten stone and water on the strap and continue this operation until a polish is obtained. Adjust the bearing in the regular way and the job is complete and the shaft will be ready for installation. All the points should be well lubricated when assembling, for in starting the engine it will be a few seconds before lubrication can reach the various points, and in many cases a bearing would be ruined before the lubrication would reach the bearing.

In Fig. 2 we have a drawing of valve construction and here we have a chance for a knock. At B, we have the valve head, at C, the valve stem. At D, the valve spring which seats the valve as it is lifted by cam O. coming in contact with push rod roller M held in position by push rod K. In case there is slack at any one of these points there will be a knock even though light it may be. In case the locking nut I, works loose allowing the screw H, to work into push-rod J, leaving a little space between head G, and the valve stem C, there will be a knock at every revolution of the cam shaft operating the valve. The space between the nut G, and the end of the valve stem should be such

that a very thin piece of paper will slip between them when the stem is warmed up from use. A worn pin at L, will allow the roller to slap on the cam and each revolution of the shaft will produce a knock, while this is not dangerous it is very annoying and should be replaced with new. To grind the valve remove the pin, or locking device, whichever it be, and take the washer F, from the stem, remove the spring D, and slip the valve out. Remove the carbon deposit and place a little grinding compound on the face of the valve. Now with a grinding device of some sort turn the valve to grind by placing it in the opening A. Turn the valve first one way and the other, lifting it occasionally to allow of any foreign substance to be

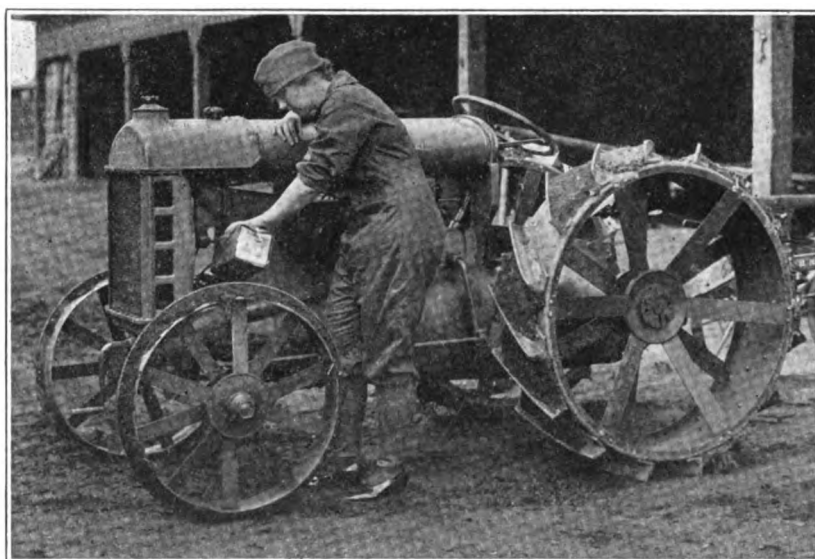
removed that might cut a recess in the valve seat and continue until a bright seat is obtained. Wash the valve and seat with gasoline and replace. Care should be taken that none of the valve grinding compound gets into the cylinder as it will score and ruin the walls of the cylinder.

In Fig. 3, we have a drawing representing the section of a gas engine which will help us to understand the carbon knock, or in other words the pre-ignition referred to in another part of the article. At E we have the cylinder; A, the piston C the fly wheel. D, represents the combustion space above the piston. We will now imagine that the head of the piston A, is coated with car-

bon deposit sufficient to pre-ignite the charge of gas. With the fly wheel C, traveling in the direction of the arrow we have the piston at the top of the stroke. Crank shaft B. is also at its highest point and being carried over by the fly wheel which is in motion traveling quite rapidly. As we advance the spark the charge will be ignited when the piston is farther down in the walls of the cylinder and the shaft holding a position at about the angle of G. Now that we have a carbon deposit the charge will be ignited earlier depending somewhat on the speed of the engine and the heat in the cylinder. If we should ignite the charge at either H, or I, we will have the pressure of the explosion bearing down in the direction opposite of the arrow and the

momentum of the flywheel trying to drag the shaft over against the pressure. The result of this will be an unnecessary strain on the shaft and as the two pressures meet there will be a metallic click or ring known as a carbon knock. The rings F, being tight holds, the pressure making the knock appear slightly louder than with the leaking ones.

In Fig. 4, we have a section of the cam gears operating the valves. A, B, represent a section of the gears. In case tooth of gear B, bottom at E there will be a grinding grating noise. In case the gear at D, is worn wide enough that tooth C, does not fill when it enters the gears will have a tendency to jerk either forward or backward due to the pressure from the valve springs bearing the push rods against the cams. In case there is slack at this point it will be necessary to replace with new gears for noisy gears are very annoying even if they are not considered dangerous. Considerable lost motion in the gears at this point will tend to make the valve open a trifle late, causing the ignition to take place a little late, thus affecting the power of the engine to the extent of the wear. Many times a very heavy



THIS IS THE LIFE!

—Photo from Over Flow Works

GIVING THE FORDSON A DRINK BEFORE A HARD DAY'S WORK. YES, WE ALWAYS DID LIKE NEAT PATENT LEATHER PUMPS EVEN WHEN WORN BY "FARMERETTES"

lubricant can be used in the gears and eliminate the rattle to an extent for trading purposes, etc.

The modern car when properly adjusted is a remarkably quiet running piece of mechanism. Unusual noise is a certain indication of trouble, embryonic perhaps, but nevertheless trouble.

Do not forget that fiber washers should never be used in the fuel line or in any part of the engine, where the gasoline can get at it. The action of gasoline upon the fiber washer has a tendency to make the motor run sluggishly by forming a deposit of minute particles from the fiber. For this reason lead washers should always be used in the fuel line, and similar locations.

The Motor Car Paint Shop---VIII.



Ground work for Transparent Colors

By following a simple principle or rule, good results in the use of transparent colors are generally secured. Upon the groundwork depends, naturally, the tone and beauty of the glaze. But few of the transparent colors will do well over a broadly contrasted, light-toned groundwork.

As a rule, make the groundwork correspond as nearly as possible to the color of the lake. Tuscan red and black are best for many of the lakes. Where a light ground is wanted and it is found desirable to dispense with the black, a rich-toned Tuscan red will suit the purpose well. Especially avoid getting the groundwork too light. Generally speaking, lakes are rich in proportion to their depth—a maroon or a Munich lake is best shown over a deep, warm, red ground; a crimson lake also requires a warm, red ground, but the ground should be brighter; a scarlet lake, glazed over a ground made of Tuscan red and deep orange chrome yellow (enough of the latter to brighten it), will do as well as under any other treatment; but, when a bright pronounced scarlet is wanted, use "Sleigh-makers' Carmine," or "Coach-painters' Carmine."

With possibly the single exception of "No. 40 Carmine," all the deep-glazed colors require depth to enhance their beauty. A light groundwork will destroy the true deep tone of the glaze, and what we admire so much in the dish will greatly disappoint us after it has dried over contrasted ground-colors.

With Coach-painters' Red—

Use No. 480 groundwork.

With Phenomenal Red—

Use No. 1127 groundwork.

With No. 883 Red—

Use No. 1127 groundwork.

With No. 157 Red—

Use No. 480 groundwork.

With Automobile Red—

Use No. 480 groundwork.

With all Deep Lakes—

Use No. 1096 groundwork.

With Coach-painters' Carmine—

Use No. 320 groundwork.

With Ultramarine Blue—

Use No. 213 groundwork.

After being applied, all colors should be given ample time to dry and harden. If varnished over too quickly, they do not show the same density of color as when allowed proper time to harden all the way through. This is particularly the case with blacks.

A very swift-drying color or black painted upon a soft lead surface is pretty sure to result in a multitude of fine cracks, and when such a color or black is painted upon a gear leaded in such manner and immediately followed with a coat of quick-drying rubbing-varnish, there is always a strong possibility that the color or black will unite with the varnish better than it will hold to the elastic lead, with the result that the color or black and the varnish would adhere and dry brittle and then snap off, leaving the bare, smooth surface of the elastic lead intact. This is an experience sometimes met with by the painter and but little understood.

Unless such lead has ample time to thoroughly harden, the above possibility is constantly present.

When the groundwork is properly adapted to the overlying color or glaze, best effects are secured by spreading and glazing over dead-flat surfaces. We would also suggest a very radical contrast in connection with the latter as well as with the pale yellows. Select a smooth

spoke and paint it perfectly flat with deep orange chrome yellow. When quite dry, flow on a coat of strong ultramarine blue varnish color. No trace of the chrome can be seen, but a very bright, rich blue tone results which cannot be obtained by any other treatment. A dull salmon color, if painted a dead-flat, will do better as a groundwork for the pale yellows (one coat flat and one coat varnish-color) than any other inexpensive method. This ground-work shuts in once for all the dark lead color of the gear, and possessing a peculiar affinity for the yellow is in turn shut in by the latter. Spread on the yellow or the blue with a free hand—to brush it on would result in streaks, while to flow it on would imply an excess calculated to make trouble after the job goes on.

THE VISCOSITY OF OIL.

One of the most used methods of expressing the viscosity of oil is in the terms of the Engler Scale. Degrees Engler means simply the ratio of the time it takes a given quantity of an oil to flow through a standard orifice as compared with the time it would take the same volume of water to flow through. Oil is usually sold however, on the basis of its specific gravity (generally measured in degrees Baume), and its heat value and moisture content. It is usually assumed that the heavier an oil is in degrees Baume the more viscous it is, but that is not always strictly true. It is not to be regretted, that oil is not specified in terms of specific gravity instead of in degrees Baume, because in any calculations involving the weight of the oil per gallon or per barrel, it is necessary to refer back to specific gravity. Further, the heaviest oil that can be designated on the Baume scale for liquids lighter than water is 10 deg. B. or unit specific gravity. Oils are now being used of 10 and 12 deg. B., and, no doubt, still heavier oils will be used, which will call for two different Baume scales and cause confusion.

Fords are built with not much more than an engine and a body and lack the little refinements and conveniences that distinguish the better and higher priced cars. Ford owners are well aware of the difference and are continually adding these little improvements to their cars.

A few suggestions for accessories of this character that will constitute a good standard variety is given below:

Accelerators	Gasoline Primers	Light Regulators	Shock Absorbers	Tire Covers
Bumpers	Gasoline Savers	Muffler Cut-outs	Seat Covers	Tool Boxes
Coils & Vibrators	Gearless Differentials	Electric Horn Buttons	Spark Plugs	Valve Tools
Demountable Wheels	Hand Horns	Oil Gauges	Speedometers	Vulcanizers
Engine Starters	Inner Tubes	Puncture Repairs	Starters	Water Circulators
Fender Braces	Inner Tube Bags	Pedal Pads	Tires	Worm Steer Gear
Gasoline Gauge	Jacks	Rear Axle Truss Rods	Tire Carriers	Wrench Sets

The Springs of the Car* III

F. M. PAULL

WHEN springs are properly designed for the particular work they have to do they will harmonize the relative movements of the chassis and the running gear, allowing the wheel and axles to pass over obstructions just as though they had practically no load other than their own weight to carry, and freezing them almost completely of impact and shock forces. To take a concrete example, assume a three wheel truck, fitted with springs and loaded with a 1,000 pound weight, to be traveling at 30 miles per hour along a road, when it meets an object about two inches high. At this speed and with an object of the approximate dimensions shown in Figure 10, the wheel will rise two inches and fall again in the space of 0.0076 second. To raise and lower the 1,000 pound

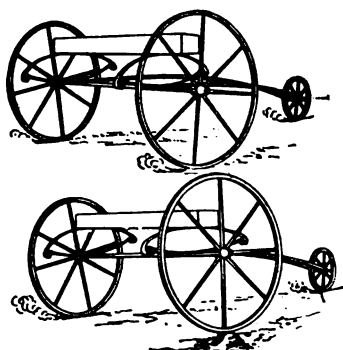


FIG. 10

weight two inches in that short time would require a force of not less than 360,000 pounds. If the springs were not there, that force would have to be transmitted and absorbed by the wheel and axle or something would have to break, but with the proper spring interposed between the disturbance and the weight, the wheel and axle have only to lift themselves and carry a few hundred extra pounds to compress the spring. The 1,000 pound weight itself, due to its relatively large mass and consequent inertia, scarcely moves from its straight and regular path.

THE EFFECT OF EMERGENCY STOPS

The last example demonstrated the easiest and most natural function of the vehicle spring. A more difficult condition exists when making an emergency stop. Referring to Figure 11, assume a four wheeled truck without radius rods and tor-

que tube, as in the Hotchkiss drive, carrying a 1,000 pound weight on two springs, to be subjected to an emergency stop that would bring it to rest from 30 miles per hour in two seconds. It requires the continuous application at the center of load of a restraining force of 700 pounds to stop the load that quickly, and that force must be transmitted from the brakes through the running gear and through the two spring supports to the load. It

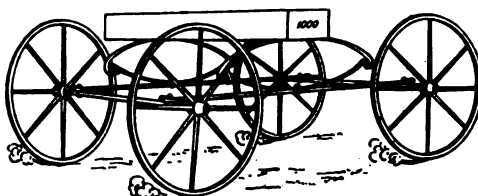


FIG. 11

is easy to see that the stress at the spring supports might be very great and that it is especially unfavorable in that it tends to twist the spring around the axle. To avoid serious accidents in extreme cases of this kind requires correct design, careful construction of every spring fastening.

CAUSES OF SPRING BREAKAGE

We might go on almost indefinitely citing concrete examples of extraordinary stresses which motor car springs may at any time be called upon to absorb without failure, but such a recital would only emphasize what we have already said. Collisions, fast running over obstructions, quick turning and skidding at high speed, extreme emergency stops, etc., are all productive of excessive and unusual stresses that may result in spring breakage and result in fatal accidents. These stresses so far exceed those incident to ordinary daily operation that many spring makers do not

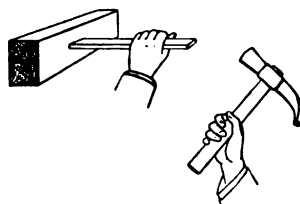


FIG. 12

attempt to take them into account because of the largely increased cost of design and manufacture. They "take a chance" that the un-

expected will not happen, but it is the owner of the car who takes the risk, and often pays with his own life or that of his loved ones.

AN EASY LESSON ON SPRINGS

It is remarkable how much useful and interesting information we can gain from the study of a very simple spring, made by driving a single flat strip of steel into a piece of wood and loading it at the end as shown in Figure 12.

Suppose now that we load this spring, or plate as it is more properly called, with 10 pounds and by measurement we find that the end sinks or deflects two inches (see Figure 13). Next, we change the load to 20 pounds, when we find that the deflection has increased to four inches. Therefore, the deflection is directly proportional to the load.

This simple relation, of course, is only true when the force is applied steadily and for an appreciable time as already explained.

EFFECT OF LENGTH

Next we hang a five pound weight on the plate and note a deflection of one inch. Then we cut the plate in half and load it again until it deflects one inch, when we find that we have used 40 pounds, or eight times as much weight as in the first instance (see Figure 14). Therefore the load for a given deflection varies inversely as the cube of the length, and for a given load, the deflection varies directly with the cube of the length.

EFFECT OF THICKNESS

The effect of the width is to stiffen the spring or plate in direct proportion. For instance, if we consider the plate in Figure 13 to

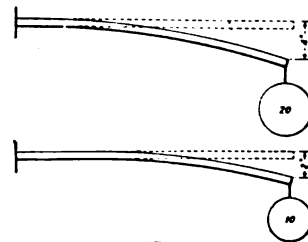


FIG. 13

be one inch wide, then two such plates side by side would each carry 10 pounds with a deflection of two inches, and if they were combined into a single plate two inches wide, the resultant plate would carry 20 pounds with the same deflection. Therefore, for a given load, the deflection varies inversely with the width, or for a given deflection the load varies directly with the width. Fig. 15.

The Care and Repair of Automobile Starting and Lighting Batteries

TESTING BATTERY REMOVED FROM CAR

If trouble exists that is clearly due to the battery or if tests on the starting system fail to clear the difficulty, the battery should be removed from the car for repair or replacement.

Leaky Jars—If the solution is found to be markedly lower in one cell than in other cells, it indicates that the solution has spilled, due to failure tightly to replace the vent plugs after filling, or that the

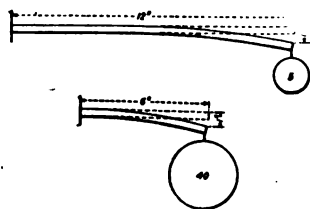


FIG. 14

jar has developed a leak. When this condition is found, the cells should be filled to the proper height (Fig. 1.) with pure water and the battery should be watched carefully to determine the cause. If the questionable cell continues to lose solution to a greater extent than do the other cells, it is sure evidence of a leaky jar. This jar should be replaced at once to prevent damage to the case.

Short Circuits—Short circuits usually occur through the giving way of the wood separators between the positive and negative plates. The cause of this may be:

First—Age of the battery.

Second—The solution allowed to fall below the top of the plates, in which case the separators will dry and crumble.

A short circuit in a cell is indicated when it becomes "dead" and the solution cannot be brought up to its proper density by charging, or when the cell will not hold its charge. Sometimes, if the separators are renewed, the cell will continue to give service. This can generally be determined by an examination of the plates. If the plates are hard and solid they can probably be used again. If they are soft, pitted

and crumbly, new plates should be installed or a new battery furnished.

If inferior plates are used they will rapidly shed their active material, which will collect in the bottom of the jar. When this material rises to the bottom of the plates it will short circuit them.

Worn out plates—If the solution in the cells can quickly be brought up under charge to the proper density and only a small capacity can be obtained on discharge, the battery is worn out, due to age or indifferent material in the plates.

The above applies to a battery under test and not on the car as in the latter case there may be faults in the lighting and starting system, causing a leak from the battery, or causing the battery to receive insufficient charge.

TO INSTALL NEW BATTERY ON CAR

See that the positive and negative terminals of the new battery are in the same position as those on the one it is to replace.

This is of great importance, especially when the car is equipped with an electric lighting and starting system. Six volt batteries have one positive and one negative terminal, but batteries used on 12, 16, 18 and 24 volt systems often have a greater number; and different systems have these terminals located in different positions. As an example, Fig. 4 shows the terminals on a 12 volt battery used with one of the Mitchell models and Fig. 5 those on a 12 volt battery used with one of the Jeffery models.

If the connections are not made correctly the starting and lighting system will not operate properly, and if the terminals of the new battery are not in the same position as those on the battery to be replaced, the wiring must be changed to fit the new battery.

Usually the polarity of each terminal is stamped thereon but as an extra precautions this should be checked with the voltmeter.

Rub connections and terminals with sandpaper until they are clean

and bright. Go over them with a rag dampened with ammonia water (one part ammonia, ten parts water) and screw connectors tight to the terminals.

Coat the terminals and connectors with vaseline or heavy grease

Be careful that the battery hold-downs or other devices for keeping the battery in place are suitable for the new battery.

If the car is equipped with a starting and lighting system have the owner operate the engine; first, to see that the battery revolves the starting motor, and, second, to see that the battery receives the proper charge when the engine is running.

Electrolyte—Electrolyte consists of a mixture of pure sulphuric acid and water.

The specific gravity of pure sulphuric acid is 1.835 or 1835 points on the hydrometer.

The specific gravity of pure water is 1.000 or 1000 points.

To prepare electrolyte use a vitreous (glass or earthenware) not a metallic one.

Pour the acid in the water, never the water in the acid.

Stir thoroughly with a wooden paddle and allow the solution to cool before taking the specific gravity with the hydrometer.

The readings should be taken at

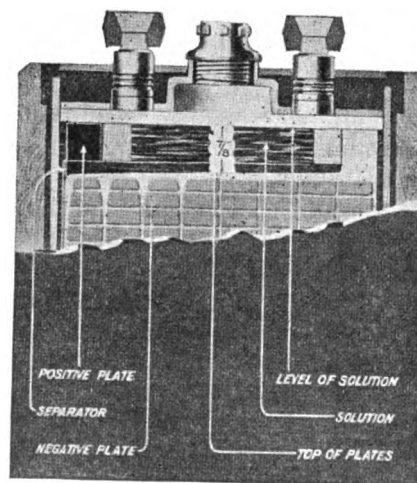


FIGURE 1: CUT SHOWING HEIGHT TO FILL THE CELL WITH PURE WATER

from 70 degrees to 90 degrees Fahrenheit.

In ordering sulphuric acid specify that it shall be chemically pure 1.835 degree.

The so called "commercial acid" is not satisfactory for use in storage batteries and, therefore,

acid or electrolyte should be purchased from a storage battery company or a distributor.

In many locations the city water does not contain substances deleterious to the plates and some storage battery companies make analysis of such water free of charge.

The sample sent should be at least one quart, shipped charges prepaid, in a clean glass bottle, with a glass or rubber stopper and marked for identification.

When the battery is fully charged the electrolyte should be 1300.

For developing repaired cells with new positive and negative plates the initial electrolyte density should be 1260.

For developing repaired cells with new positive and old negative

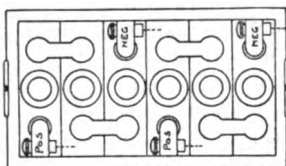


FIG. 4

plates the initial electrolyte density should be 1280.

When wood separators only are replaced, the initial electrolyte density should be 1280.

When a battery is shipped "dry" that is fully charged, but with the electrolyte removed, the electrolyte for replacement should be 1275.

To bring up the density of the electrolyte in a low cell the strength of the electrolyte added should not be greater than 1400 or it may damage the plates.

Never add pure sulphuric acid to a cell, as it will gas and heat violently and will damage the plates.

Table showing the approximate number of parts of pure water to 10 parts of sulphuric acid (specific gravity 1835) to prepare electrolyte of different densities.

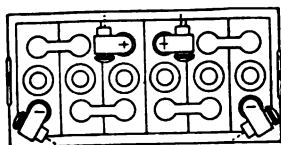


FIG. 5

READINGS AT 70° F.

Density	Parts by weight.	Parts by volume.
1260.....	17.....	30.
1275.....	16.....	28.
1280.....	15.....	27.
1300.....	13½.....	25.
1400.....	8½.....	15.8

Table showing approximate number of parts of pure water to 10 parts electrolyte (1400 spec. gravity), to prepare electrolyte of different densities.

Density. Parts by weight. Parts by volume

READINGS AT 70° F.

Density	Parts by weight.	Parts by volume
1260.....	4.7.....	8½
1275.....	4.....	6.
1280.....	4.....	5½
1300.....	3.....	4¾

Next month—"Charging Apparatus, Methods and Battery Charging."

THE ARMY HORSESHOER QUITTOR—

Treatment.—Find out, if possible, what has caused the quitto. If it is result of a nail prick or a festered corn, open it up on the underside of the foot, allow the pus to run out, and then treat as directed in paragraph 77. If no nail prick or corn can be found, treat the quitto from above, by injecting into the sinuses one of the following solutions; carbolic acid 1 part and water 20 parts; creoline 1 part and 25 parts water; bichloride of mercury one part to 500 water. This treatment should be continued for several days, at the end of which period, if the parts do not appear in a healthier condition, inject into the tubes one dram of bichloride of mercury well shaken up in one ounce of water. This will cause a separation of the diseased walls of the tube from the healthy parts of the foot. Poultices of flax-seed meal assist this separation. Keep the parts clean, and wash out with carbolic acid or creoline as at first. If the sore does not heal under this treatment, a surgical operation by a veterinarian will be necessary.

Sidebones.—Sidebone is an ossification (turning into bone) of the lateral cartilage, frequently resulting from improper leveling of the foot. Horses with flat feet and weak quarters are predisposed to this disease.

Symptoms.—A hard unyielding condition of the lateral cartilage, with or without lameness.

Treatment.—If the horse is lame the first step is to remove the shoe and level the foot; then let the horse stand in a tub of cold water for several hours a day, or apply around the coronet swabs kept wet with cold water. As soon as the fever has disappeared, clip off the hair over the sidebones and blister with this ointment; biniodide of mercury 1 part, cosmoline 5 parts;

mix thoroughly and rub in well. Tie up the horse's head so he cannot reach the blistered parts with his lips and keep him in this position for 24 to 48 hours. Then wash off the blister, using warm water and castile soap. The washing must be repeated ever day until all the scabs formed by the blister have been removed. During this time keep the horse standing quietly in a clean and level stall. If after 10 days he has not improved, firing, followed by a long period of rest, may prove beneficial.

In shoeing a horse afflicted with sidebones, level the foot carefully. If the foot is affected on one side only, the affected side is liable to be contracted, because proper expansion has been prevented on that side. In this case the web of the shoe should be widened sufficiently to extend out to where the normal foot would be. A plain shoe with a rolled toe is recommended. Frog pressure produces soreness and must be carefully avoided.

QUARTER CRACKS AND TOE CRACKS

A toe or quarter crack is a split in the horn of the wall; the position of the crack determines the name applied to it. Horses with thin, weak quarters are predisposed to quarter crack.

Causes.—Excessive dryness of the hoof, heavy shoes, large nails, and nails set too far back toward the heels.

Symptoms.—The crack generally starts at the coronary band and gradually extends downward to the lower border of the wall. The most common form of quarter crack is a deep fissure extending through the wall and causing a pinching of the sensitive structures. When, however, the crack is not deep, there is seldom any lameness.

Treatment.—The first step is to remove the shoe and soften the horn by poultices or by standing in water for a few days. Then cut away the hard overlapping edges of the fissure and thin the wall on each side so that there will be no friction between the edges of the crack. As the wall grows down from the coronet, the upper end of the crack must be carefully observed to see that the new horn grows down strong and smooth. In time the crack will disappear at the lower edge of the wall. If the sensitive

laminae have been exposed by this operation, the parts should be washed with a solution of creoline, 1 to 50, and the wound should be dusted with acetanilid and covered with a pad of oakum held in place by a boot or bandage. In a few days a thin layer of horn will be thrown out, covering the sensitive laminae. The horse can then generally be put to work.

After a quarter crack has been trimmed out the horse should be shod with a bar shoe, the wall beneath the quarter being cut away

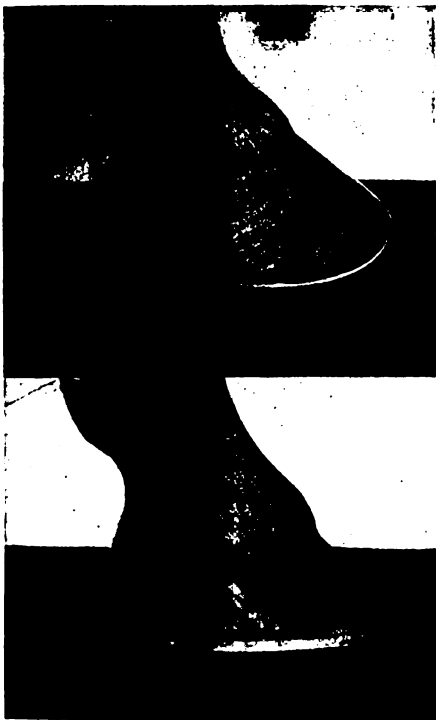


PLATE XV.—QUARTER CRACK.
BEFORE AND AFTER TREATMENT
AND SHOEING

so that it will not come in contact with the shoe. (Pl. XV.)

In case of toe crack the operation is the same. In shoeing, the wall is cut away at the toe to prevent pressure. A bar shoe, rolled at the toe and with a clip on each side of the crack, is recommended. The bar shoe serves two purposes:

1. Ordinarily it is not possible to drive the proper number of nails on the side of the affected quarter, but the bar keeps the shoe in place on account of the firm nailing on the other side.

2. The bar gives frog pressure and expansion, which are desirable because quarter cracks usually result from a weak and drawn-in quarter.

PUNCTURE OF THE SOLE AND FROG—PRICKS IN SHOEING

A puncture of the sole or frog is usually caused by a horse stepping on a nail, a piece of broken glass, or other sharp object. If the wound enters the soft structures of the foot, it results in lameness and the formation of pus.

Pricks in shoeing are of two kinds; first, when the nail is driven into the sensitive structures; and second when it is driven in too close to these structures; causing a bulging in of the inner layer of horn, which is forced in upon the sensitive laminae. In the first case the horse goes lame immediately, in the second case, lameness may not appear for several days or weeks.

To detect a nail prick, remove the shoe, examine each nail as it is withdrawn for traces of moisture. Then use the hoof tester. When the sore spot is pressed the horse will flinch.

Treatment—Open the wound and let out any pus that may have formed. Wash out with a solution of creoline, 1 to 25, or of carbolic acid 1 to 20. Unless the pus has a good outlet it will burrow into the surrounding tissues, and quittor or canker may follow. Moreover there is always danger of lockjaw (tetanus) in all cases of punctured wounds, especially in the feet. The germ of this disease is present in nearly all soils, and is very liable to be carried into the wound by the nail or other object. After the wound has been opened up and washed out, the foot should be placed in a hot flax-seed poultice, a fresh one being applied three or four times a day, and the parts washed out after each poultice, as in the first instance. The treatment should be continued until inflammation is reduced and the formation of pus has ceased. The hole can then be plugged with oakum and tar, the shoe reset and the horse put to work.

FOUNDER OR LAMINITIS

Laminitis is an inflammation of the sensitive laminae (generally of the front feet) and may involve the adjoining structures. There are two forms of the disease, acute and chronic.

Ordinarily in a case of inflammation, the blood vessels become

enlarged and a surface swelling appears; but when the sensitive laminae are inflamed, the local veins confined between the horny wall and the coffin bone have no room to expand; in consequence the pain of acute laminitis is very sharp and persistent.

ALLOYING IRON WITH COPPER, BRASS, ETC.

Although often done in the foundry, it is not very generally known that iron, free from carbon, alloys very well with copper and some other metals to nearly any proportion, and that the iron does not appreciably separate out when zinc or tin is added. Such copper-iron metals are very resistant to atmospheric influences, while they are as readily cast or rolled as other bronzes, but they are troublesome to make. Thus, if we take carbonless mild steel as the purest form of iron obtainable commercially, and melt this with good ingot copper we get a very good alloy of a stable character, and could probably get from 20 per cent to 40 per cent. iron into the final alloy provided proper precautions are taken. The copper would melt at somewhere between 1925 deg. F., and the steel at about 2700 deg. F., dependent on quality, the two metals being charged together in the crucible with serious loss, but it would be desirable to first melt the steel and then add the copper, afterwards alloying in the zinc or tin as might be needed. In doing this work, however, it is necessary to use clay crucibles and risk loss of metal through breakages, or to use plumbago crucibles, having clay liners, these being expensive, but in the end probably cheaper than the clay pots. There must be no contact with carbon, and the crucibles must be covered the whole time the alloy is being made, because absorption of carbon will render any copper-iron alloy too unstable for practical work. In ordinary alloying where stirring is done with wrought iron or steel rods there is considerable alloying of the iron with the other metal or alloy, and for this reason stirring and feeding pods are always kept coated with a mixture of plumbago and clay, iron not often being wanted in ordinary bronzes and bronzes. No fluxes are wanted in this work, but a little glass to form an airtight skin over the metal is not a bad thing if it is not overdone.

Queries-Answers-Notes



THIS department is the meeting place where you are free to ask for information, answer questions, discuss shop matters and business conditions and any other notes you feel would be of interest to a fellow mechanic. Make use of this Department as often as desired.

About Lead Oxide—Will you let me know through "Our Journal" what the yellowish-green substance is that forms on the top of lead or babbitt metal as soon as it reaches a low, red heat. Is there anything but charcoal to prevent this?

JEROME DE BRUINE, Illinois.

In Reply—The yellowish-green powder that you are having difficulty with is lead oxide which is invariably present when these metals are heated. When metals are heated they are very readily attacked by oxygen and the oxide comes to the surface in the form of dross along with any foreign substances that may be in the metal. This dross is nothing more than lead oxide caused by the union of metallic lead in the ladle with oxygen in the air. When lead or tin are in the solid form they are not so readily attacked in this manner. It is for the purpose of preventing oxygen coming into contact with the molten metal that charcoal is used in the melting pot and it is the most satisfactory substance for this purpose. The dross that is skimmed off is still of value and can be reduced to its metallic state again. The dross should be saved until an amount sufficient to justify the trouble has been accumulated. It is then packed in the melting pot, filling it with alternate layers of dross and charcoal. If the melting pot is brought to the proper heat and maintained for a few hours the dross, or by far the greater part of it, will be found to have disappeared and in its place will be the new metal.

S. S., New York.

Gear Drive for Metz car—I have a Metz touring car, 1916 model, friction drive. Is there any firm that makes a gear drive that can be installed on this make of car? I am having some trouble with the drive and rear axle. R. W. Brown, New York.

In Reply—The Metz company does not nor never has equipped any of its cars with any but friction drive and has not made any experiments in this direction. There is no firm, to the best of our knowledge which manufactures a gear drive that could be applied to this car.

J. S. H.

Nebraska Convention Program—The 12th annual convention of the Nebraska Blacksmiths, Horseshoers and Wheelwrights Association will be held on October 16 and 17 in Auburn, Nebraska.

The following is the program that has been arranged for the visitors.

October 16—Registration of delegates, address of welcome by Mayor Lafe Higgins; Discussion and selection of price committee; Dinner, served by Ladies Circle; Demonstration of oxy-acetylene welding by C. C. Good; unfinished business; Workmen's Compensation Law and accounts; election of officers of Mutual Fire Insurance Co.; addresses by trade representatives; get-together meeting, smoker

and luncheon.

October 17—Local district and state organization's regular order of business; subject for discussion "How much should a blacksmith horseshoer receive per hour, per day, per week and how much should an apprentice receive for the same?": Looking Back 50 Years," Dietrich Spethman; "Organization", Bob McIntyre; Selection of 1919 convention place; Annual election of officers; Dinner served by W. O. W. ladies circle; Photograph of

FROM 'WAY DOWN SOUTH IN THE LAND OF COTTON



ABOVE—PLOWS AND HARROWS MADE AT THE HUX SHOP.

BELOW—SHOP OF R. C. HUX & SONS IN MISSISSIPPI.



association members; Sight seeing auto ride; Entertainment arranged by President Hays of Peru State Normal school in costume; Banquet under auspices Auburn Commercial Club.

The Auburn Commercial Club, Auburn Hose Co., and the Auburn Community Club will take active part in the entertainment of visitors while in the city.

The association officers are; Jens Miller, president; G. C. Casten, vice president and C. C. Good, secretary-treasurer.

Good news from the antipodes—Things move so fast and change so rapidly in these feverish war times that I find it necessary to supplement that letter of mine appearing in last November's issue. By the time that letter appeared, John Frederick was back in New Zealand with his right arm fixed up as good as new and running his old shop with one apprentice, Old Jack having been laid up with heart strain has now had a six months' spell. The young fellow took to the scrap heap like mother's milk and managed the shop quite creditably. When I had been about four months idle I began to wonder what side of the ledger I had got on to, so I ran up a balance sheet and was agreeably surprised to find that they had earned me a prof-

it as well as their own, clearing both shop and household expenses in these times is not bad for a man and a boy but we mustn't forget the scrap heap.

John A. Munro, New Zealand.

Can't get Help—"I tell you we smiths are up against it with the present high prices for shop supplies. I am still trying to hold on to my business but can hardly get help when I need it. I have lots of calls for auto repair work but must often decline owing to lack of assistance and then too, I am busy most of the time with farm implement repair work and under present circumstances this class of work comes first."

D. W. Bunch, North Carolina.

Sixty years and still for us—"Had intended to discontinue as I am pretty well worn out after 60 years at the anvil but still do some light work. The journal is well worth the price and then some. I think all blacksmiths should be in the family, especially the young ones, so I will continue."

Calvin Metcalfe, Maryland.

Interesting Reading—About seven out of every ten blacksmiths located on cross-roads or hamlets have made some preparation or installed apparatus for the purpose of making ordinary repairs on

automobiles. In most cases the equipment is meager, incomplete; but yet sufficient to enable them to handle many jobs that they would otherwise lose. This condition does not apply to the cities where the two vocations are still practically separate and distinct.

During the last five years great strides have been made in road building thruout the West; many cattle trails and little used roads have been transformed into graded, well-rounded turnpikes, topped with a layer of gravel and rolled down with steam roller. Naturally this improvement tended to promote travel. As the auto became popular and reached far into isolated districts, when accidents happened twenty miles from town, the first impulse was to reach the nearest blacksmith shop—by its own power if possible—if not a team of horses was engaged to do the 'stunt'. If the smith was competent to do the job he made the necessary repairs; if not the auto was hauled into town. In either case the incident revealed possibilities. After a dozen such calls came to the shop, the shrewd, enterprising smith realized that it was up to him to prepare for and cater to this new phase of trade—to get a few of the most essential tools required for repair work.

Auto Traffic Rules in Japan Read Queer

YOU must drive your automobile at the speed of eight knots per hour on the city roads and at twelve knots per hour on the country roads.

When you see a policeman throwing up his hand you must not drive in front of him.

When you get ahead of the passenger on foot or the horse, you must ring the horn.

When you meet the cow or the horse speed slowly and take care to ring the horn and not be afraid of them. Drive slowly when you meet the horse or the cattle, do not make them afraid and carefully make the sound. If they afraid the sound you must escape a little while at the side of the road till they pass away.

Do not drive the motor-car when you get drunk and do not smoke on the driver seat.

But the middle-aged blacksmith who had worked in a certain line for years—making plow clevises, ironing whiplashes, setting wagon tires, and shoeing horses could not readily adjust himself to the demands of the automobile with its complicated engine and different ignition systems—the *modus operandi* of making delicate repairs could not be learned in a day. Many of these men gifted with perspicacity, engaged helpers or took in partners who were familiar with the auto mechanism and thus took advantage of the trend of the times.

In Denver at present all large department stores, groceries, laundries, clothes cleaning shops, and bakeries are using auto delivery service; also all the vehicles used by the police patrol, ambulance corps, and the fire department in the business district are now motor propelled. The only firms of any importance still using horses for delivery service are the ice-men, the coal dealers, and the milk men—and at least one firm in each of these three industries is now using autos for delivery, indicating that it is only a question of time when all will be using automobiles. This change, coming mainly within the last three years, has displaced a large number of horses, and a corresponding number of horse shoers were forced to seek new quarters or join the procession i. e. learn automobile repairing.

James A. Patterson, Colo.

Mr. Lewis is right—In this department in your June issue, I read your suggestions to a reader to get into the auto repair business which I deem sound, but a little further on you put the proposition up to him in a manner which I believe is misleading by stating that: "along comes a boy with 24 hours' experience, so to speak, opens up a shop and makes good at automobile work and taking what appears to be the cream which rightfully belongs to the blacksmith."

Now if the automobile business speaking from a mechanical standpoint, is of no more importance than that it is bound to be of no mechanical value to any blacksmith or machinist. From my own personal experience of over 35 years in the mechanical trades, I believe that the automobile business, mechanically speaking, is the worse butchered up business that is being practiced today and that the automobile is the worst imposed upon piece of mechanism that ever existed, from the fact that 95 percent of the purchasers of automobiles don't know the elementary facts of the mechanical principles involved. Therefore, the owner of an automobile is at the mercy of the jack-leg mechanic and the wise boy that made good in a few days by demonstrating his ability in blowing the horn and racing the motor to the astonishment of the owner.

I have read your paper for quite a while and I will honestly confess that it has been of inestimable value to me and I

cannot say anything that is too good for it for I know that it has been the medium of helping lots of mechanics besides myself in various ways and I believe that anyone taking up automobile work will do well to start right by employing an old head to get him started off right and show him that an automobile embraces several branches of mechanics that are delicate and require the skill of the thorough mechanic to be successful.

I do not wish to have you misunderstand what I have written as being merely a desire to criticize but it is meant to start the blacksmith taking up auto work out with a hint that he will sure "haah" things if he is under the impression that he can be a successful auto mechanic in 24 hours but at the same time I believe it good, sound business sense for blacksmiths where they are so situated, to take up automobile work in connection with their smithing business for blacksmithing is not what it was a few years ago and will be quite different in a few years from what it is today.

W. L. Lewis, Oklahoma.

We had in mind just exactly the sort of a mechanic that Mr. Lewis refers to—one with 24 hours experience. Men of this caliber are not mechanics, do not pretend to be and probably never will be but nevertheless relieve auto owners of their cash.

Editor.

Never too busy to miss it—"Busy? Yes. The present high cost of farm implements makes repair work pay. I'm busy but not too busy to miss my best helper."

G. F. Plummer, Iowa.

SURE! IT'S SOME PAPER.

Somehow or another we got hold of the name of Mr. A. D. Canady, who conducts an up to date auto repair shop out in the great state of Nebraska. We sent him a sample copy which happened to be the June number. Today we heard from Mr. Canaday and he says:

"Much obliged to you for sending me the sample copy. It has already more than paid for its subscription for one year. If I am too late to get the July number please send me one as I do not wish to miss a number."

A Pointer or Ford Axles—"You know the blacksmith is the busiest man on earth today. He is expected to keep up everything that rolls—Ford cars too.

"If anyone bothered with bent Ford axles will get a small rail bender or 'Jim Crow' as they are called around the mines, the axles can be straightened in five minutes without removing from the car."

Lewis & Lacy, Kentucky.

Like a Letter from Home—I have been reading the journal now for a year and I always read it with much pleasure and profit. A man never learns too much and

one learns as long as he lives. Therefore I feel that The American Blacksmith, Auto & Tractor Shop is worth double the price because one always finds something there about your own line of business and further you hear what the others in the trade are doing over the country.

Our organization here is in good shape and we don't find any slackers around here. We keep right up with the prices. We charge 50 cents for shoes from 00 to 5 and 60 cents for 5 to 7 and 75 cents for No. 8 shoes. Wagon tires 3x½, \$24.00 and buggy tires \$8. We charge these prices and receive the money without kicking. Of course once in a while some farmer kicks but I generally take a dollar from my pocket and show it to them and ask him whether he knows the difference in that dollar to what it was three years ago.

Don't be a slacker boys and don't get afraid of the farmers if they come along and say they can get their work cheaper somewhere else.

Some time ago a man asked for my price on a set of 3x¾ tires and I told him \$35. He said that he would consider it and sometime later when I asked him about the matter he replied that he had had the work done by one of my competitors for \$30. My competitor is secretary of our organization and I thought that was rather strange but on investigation my competitor told me that the tires were 3x¾ instead of the larger size that I had quoted.

Once more, don't be a slacker, keep the price up, it's worth it and don't listen to everybody who has a kick or a knock. The time has gone by when we can shoe a horse for 40 cents and still make money. But more than anything else good service is the tie that binds customers to any business.

The only man I ever knew who could hold trade without paying too much attention to it was Ike Blumstein, a shoe dealer. When he had so many customers in the store at one time that he couldn't wait on them, he took their shoes off.

Fred Van Der Scheer, Michigan.

With the Colors—In sending in his subscription until 1950 Sergeant S. G. S. says "I have been in the blacksmith business for more than 20 years and many times I have found good things and new ways of doing some jobs through reading.

"I have worked in nearly all of the states in the Union, from Boston to Frisco and from Canada to Central America also New Zealand and Australia and have seen a good many ways of blacksmithing.

"I think the blacksmith ought to get more pay for his work. It seems to me that the blacksmith's trade is the hardest in the world to learn and therefore, he ought to get his worth out of it like any other trade. One thing that we must all do and that is to stick together and not 'buck' one another."



Accessories and Supplies of Interest to the Trade

NORWESCO "TWELVE-TWENTY"

By perfecting a non-freeze that the motorist can test with on ordinary Battery Hydrometer, the Northwestern Chemical Co., Marietta, Ohio feels that it has supplied a need which has been long felt by every motorist who has ever driven a car in freezing weather.

Norwesco "Twelve-Twenty" is the name of this radically different liquid. The easy-to-test feature is the "big idea" back of it, but running a close second in importance is the fact that "Twelve-Twenty" requires no mixing or dissolving—it comes ready to use right out of the can. The Norwesco Laboratories feel that every motorist who has ever put in a messy half-hour measuring and compounding a non-freeze mixture will appreciate this "Twelve-Twenty" feature at once.

Because it can so readily be tested, "Twelve-Twenty" does away with all guess work in connection with radiator.

The solution is made with a specific gravity of 1220, hence its name. If evaporation or leakage causes any changes in the solution the hydrometer discloses that fact and a weak solution may then be restored to standard strength by the addition of "Twelve-Twenty." If the test shows undue strength, dilution with water corrects the defect. Thus a motorist may test his non-freeze solution as he does his tires or his battery and the close check he can keep on the solution should go a long way toward reducing last winter's record of more than 100,000 frozen radiators.

There has been much complaint by motorists over the tendency of the commonly used anti-freeze solutions to find leaks. This fault is said to be totally lacking in "Twelve-Twenty." On the contrary, the tendency of "Twelve-Twenty" is to keep the cooling system fluid-tight. Its boiling point is 12 degrees higher than that of water, so it evaporates very slowly. In this way it overcomes one of the chief objections to alcohol mixtures. The claim is made, also, that it warms the motor more quickly than water, thus reducing the "popping" and enabling the engine to settle sooner into a smooth, easy motion.

Norwesco "Twelve-Twenty" will be sold in three sized containers. One gallon \$1.25, three gallon cans \$1.15 per gallon, and five gallon cans \$1.00 per gallon.

A powerful campaign of advertising in the Saturday Evening Post and other publications is expected to put Norwesco "Twelve-Twenty" into the "Big seller" class along with Se-Ment-Ol, the radiator cement with a million users, Skalex, the radiator cleaner, and the other well-known

products of the Norwesco "Chemically Correct" Line.

WRITE FOR THIS BOOK— YOU NEED IT.

The multitude of different cars on the market and the consequent variations of size in brake lining needed for renewals has been successfully answered in a booklet just published by General Asbestos & Rubber Company of Charleston, S. C., manufacturer of "GARCO" Brake Lining.

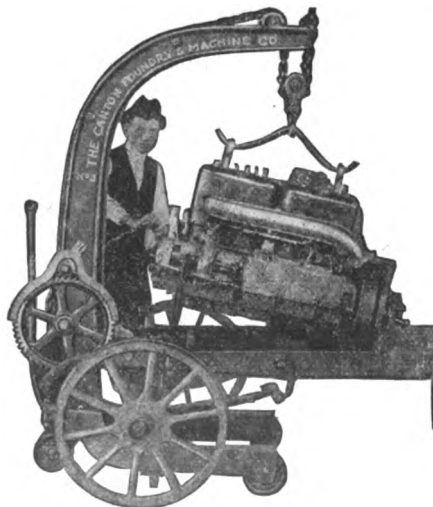
Listed in this booklet is the name of practically every passenger and commercial vehicle manufactured. The different models of each are listed by year or number. As it now stands the data given regarding the number of pieces of brake lining, the length, width and thickness needed for renewal, is thoroughly up-to-date and it is the intention of the Company to issue revisions from time to time as may be found necessary.

The Garco Brake Lining Data Booklet is of convenient size to be slipped into a vest pocket. It will be gladly sent free of charge to any dealer or repairman requesting a copy and mentioning this magazine. A number of pages have been furnished blank for use in making memoranda and in all this booklet will be found of real, practical value to any one interested in the brake lining renewal business.

THE CANTON PORTABLE CRANE

All sorts of arrangements are to be found in different auto repair shops for doing the heavy lifting jobs that are always turning up. Some of these schemes work and by far the larger number are positively dangerous.

The illustration shows a portable hoist manufactured by the Canton Foundry and Machine Co., of Canton, Ohio that is "just the thing." The picture also shows just how easily and conveniently this hoist can be handled. With its use it isn't necessary to rig up overhead hoists, blocks and tackle and all the usual makeshifts.

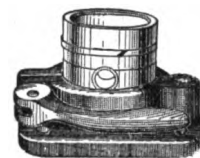


CANTON PORTABLE CRANE

This hoist has a lifting capacity of 2½ tons and weighs 890 pounds. With it one man can handle work that would require the ineffective tugging and straining of a half dozen with the risk of someone getting hurt.

STORM PISTON VISE

The Storm Piston Vise is a new article of great value in every automobile and tractor repair shop. It holds the piston firmly while fitting



STORM PISTON
VISE

the rings, bushings, pin connecting rod, etc., without loss of time and without injury to the various parts; it is especially valuable, in tightening the connecting rod bolts.

A common practice in repair shops has been to hold the connecting rod in an ordinary bench vise while performing this operation, with the result that the rod often becomes twisted or bent because of the strain applied in tightening the bolt, causing trouble when put back into service. At the same time this practice interferes with the free use of the bench vise for the common work of the garage. The slow awkward method of working on the connecting rod in the bench vise is entirely done away by use of the Storm Piston Vise.

The Storm Vise is neat and simple in design and can be permanently attached to bench or motor stand. Circular giving full details will be sent to any one on request by addressing Storm Manufacturing Company, Dept. AB, Thompson Iowa.

Dyke's Automobile and Gasoline Encyclopedia, seventh edition is just off the press. Price \$3.50. \$3.82 postpaid. Cloth Binding.

Now that Mr. Dyke has brought out a larger edition with many additions and improvements in the way of revision and illustrations, there is no reason why he boook should not be classed as the "best seller" of automobile books.

Each and every subject has been carefully revised and brought up to date.

The ignition subject is made wonderfully simple and clear, as is also the subject of electric starting and generating system.

The repair subject deserves special mention. Every part of a car or engine is thoroughly treated.

There are many new additions to the seventh edition, such subjects as Trucks, Tractors, Motorcycles, Airplanes and Airplane Engines, are thoroughly covered.

The four-wheel drive and internal-gear-drive rear axle are fully explained and illustrated. Ignition, Carburetion and kindred subjects dealing with the truck engine are described.

The Tractor subject deals with different drive methods, as "chain" and "rail-track" treads, transmission system, tractor engines, ignition, carburetion, Holley kerosene vaporizer, air washers, etc., etc.

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THE BLOW HAS FALLEN

The anticipation of many that automobile production would be seriously affected if not entirely stopped is realized by the recent order of the War Board advising manufacturers of passenger automobiles to convert their plants to 100 percent war work as rapidly as possible and to place them on that basis not later than January 1, 1919.

Automobile manufacturers had agreed voluntarily to curtail the production of passenger car industry to 50 percent. The war industries board declared that the present situation regarding steel and other materials needed for war work gave little if any assurance of material required for the manufacture of passenger automobiles even after providing for war requirements. The letter of the war industries board follows, in part;

"We are in receipt of and have given very careful consideration to your communication of August 8th, embodying the resolutions passed at your meeting at Detroit on Tuesday, August 6th. We note that the manufacturers have voluntarily agreed among themselves to curtail the production of passenger cars 50 per cent. While this is clearly a step in the right direction and furnishes a basis for each and all of the manufacturers without further delay to make appropriate reductions in selling, general and overhead expenses, still it is only a step and further curtailment is inevitable.

"We strongly believe that it is the best interest of your members and all other manufacturers of passenger automobiles to undertake to get on 100 per cent. war work as rapidly as possible and not later than January 1, 1919, for in no other way can you be sure of the continuance of your industry and the preservation of your organization."

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DON'T GIVE MONEY TO AGENTS

The American Blacksmith, Auto & Tractor Shop DOES NOT employ subscription agents. Any person representing himself as such is an impostor and should be so dealt with. Notify us immediately if anyone claiming to represent this journal calls upon you.

"THE COAL OUTLOOK"

"The year's coal requirements, as carefully surveyed by the Fuel Administration, foot up eighty million tons more than last year's production. In spite of all efforts to increase output the gain in the first five months of the year was only ten million tons. There is little chance of doing very much better than that in the remainder of the year.

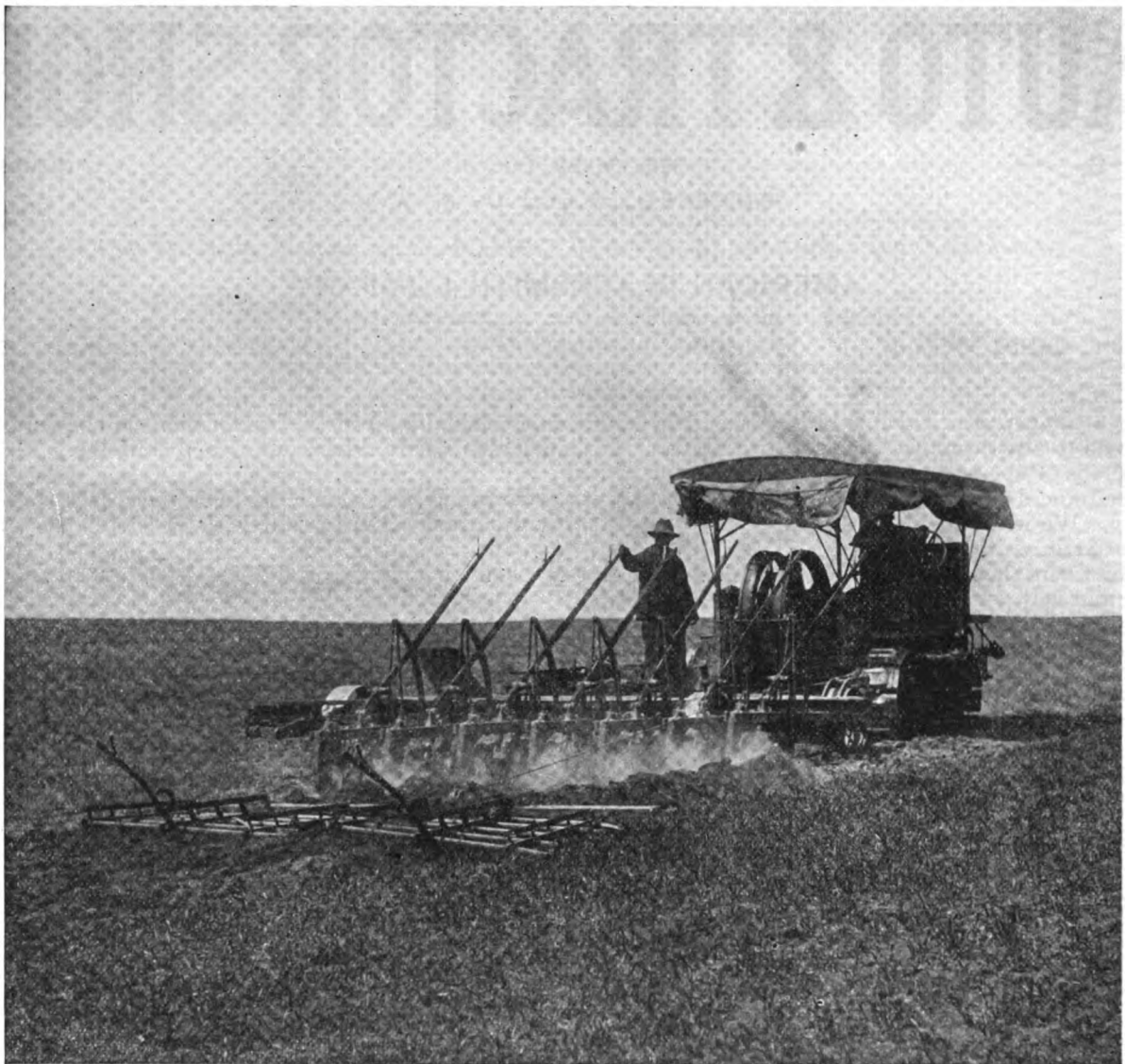
"On the face of the returns we have the hard fact of a deficit of fifty to sixty million tons. You know what coal deficit meant last winter. It will mean that this winter.

"This deficit can be overcome by rigid economy in the use of fuel. If the two hundred and fifty thousand steam producing plants in the country and every household will see that the furnace is in proper condition and burn coal to the best advantage we shall have coal enough to go round. If there is the usual waste we shall suffer.

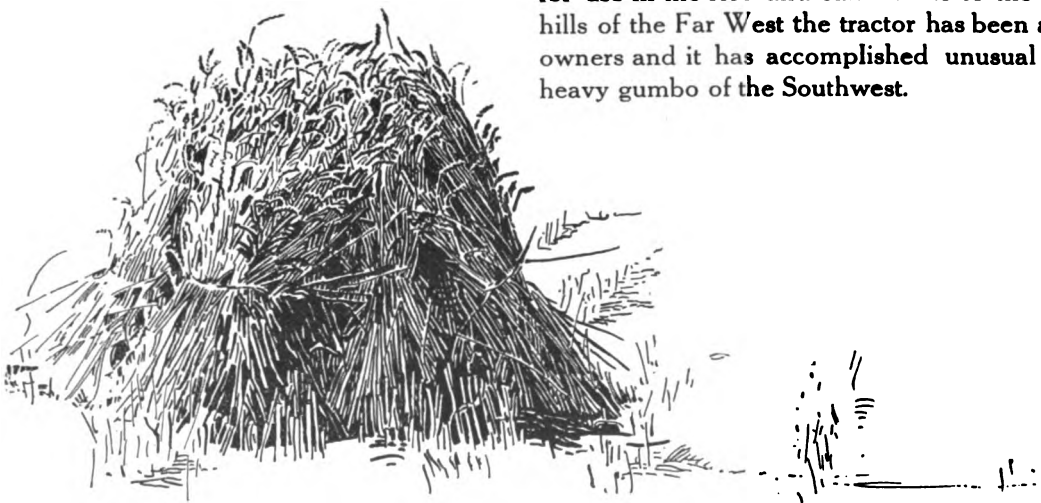
"They have learned how to use coal economically in Europe—through having to pay all the way from twenty to ninety dollars a ton for it. The man who is paying that does not need any fuel administration to urge him, on patriotic grounds, to stop wasting coal. He develops the keenest interest in that subject without prompting; and he saves the coal.

"If our Government took its hand off the fuel situation to-day there would be no wasting of coal next winter. The price would go to such a height that every man who burned a ton of coal would make it his personal business to see it was burned to the best advantage.

"The Government will not take its hand off. It wants poor people to have a chance at fuel too. It gives the people the benefit of a not exorbitant price. They ought to show their appreciation by using the coal just as carefully as though they were paying the European price."—Saturday Evening Post



THE tractor takes things as it finds them. It can work in the tough sod of the Northwest. It is unsurpassed for use in the rice and cane fields of the South. In the hills of the Far West the tractor has been a boon to farm owners and it has accomplished unusual success in the heavy gumbo of the Southwest.



“Getting More Miles Per Gallon”

ALBERT MARPLE

In modern times when the price of gasoline is doing the “airplane stunt”, about the principal topic of conversation and discussion in and out of automobile circles is that of “getting more miles per gallon”. The first thing the prospective automobile owner asks when he enters the automobile show room is “How many miles will this particular car make on a gallon of gas”. Of course, some fellows do not have to worry about the price of gas, nor anything else, for that matter, but with most of us the “mileage” question is, these days, a rather serious one.

This being true, the fellow who



FOURTH—WATCH THE MIXTURE AND ADJUST THE CARBURETOR TO GIVE THE “LEANEST” MIXTURE. THE CAR WILL RUN ON SATISFACTORILY

will tell us how to increase the mileage we are getting from any given amount of gasoline is a true friend—he is the fellow the motoring world today is looking for. It may be said that, generally speaking, there are nine very effective ways of increasing the mileage, the first of which is to get a good car. The other eight are as follows:

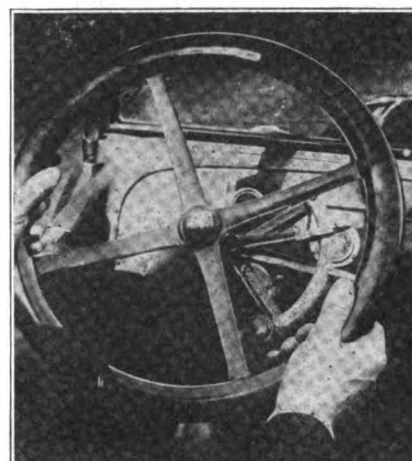
First—the owner should see to

it that all of the bearings of his car have plenty of oil and grease at all times, for nothing will cut down the power, as well as prove injurious to the machine, as will dry bearings. This fact is not at all new, but there is a surprisingly large number of people who are satisfied to “think” that their machine is well lubricated. Very often the result of this “thinking” is an undesirable garage bill, as well as a continuous expense for gasoline. Don’t forget the lubrication.

Second—Buy good oil. The car owner should know at the very start that the oil that is cheapest so far as first cost is concerned is generally the expensive oil in the long run. Cheap oil burns quickly and for this reason it either requires more of this oil to lubricate a given surface or more gasoline to furnish power to drive the pistons over a half-lubricated surface, this operation very often being injurious to the walls of the cylinders as well. The very best cylinder oils do not cost a great deal when the mileage obtained from them is considered, so why experiment and thereby run a chance of ruining the machine?

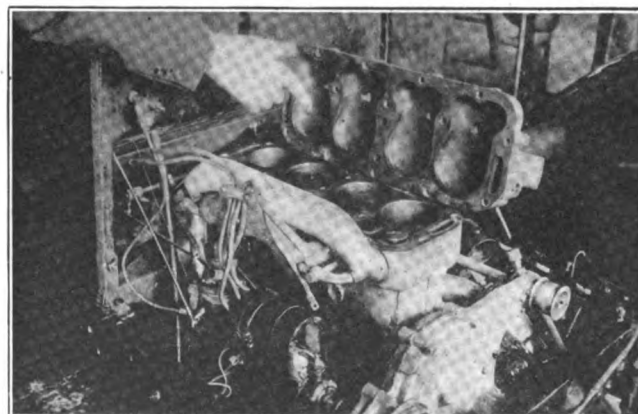
Third—See that the gasoline is measured by the filling station or garage employee. And right here we are not trying to “slam” any particular person or oil company, but we do know from experience that all gasoline pumps do not measure alike. Not long ago we made a test which was as follows:

As there is no gasoline gauge on our machine, we decided, in order that we might not be stranded on the road by our gas tank running dry, to carry an extra gallon can of gasoline along with us at all times. It was just this can which showed us where the difference is. At one station for a gallon the can would be filled to



FIFTH—KEEP THE SPARK LEVER ADVANCED AS FAR AS POSSIBLE

the brim, while at others the surface of the gasoline would come an inch below the top of the can, and at one station not many miles from the writer’s home there was still four inches of air space in the top of the can after the “gallon” had been dumped in. We happen to know that that can holds an even gallon. Another instance: A friend of ours was starting on a little trip, but before leaving drove to an oil station and asked to have three gallons of gasoline put in the tank. His gasoline gauge, which is practically true, showed that for three gallons the gas station man deposited just a trifle more than two gallons of gas in the tank. These are not fables, but facts. A



SIXTH—CONSIDER THY ENGINE AND KEEP IT FREE OF CARBON

fellow cannot reasonably expect to get "the miles" if he doesn't get the gasoline.

Fourth—Watch the mixture. A mere regulation of the mixture being fed to the carburetor will, in many instances, mean an increase in fully twenty per cent. in the mileage. The idea is to find the leanest mixture the car will run satisfactorily on, then keep the carburetor adjusted to that point.



EIGHTH—TIRES SHOULD BE INFLATED TO THE PROPER PRESSURE.

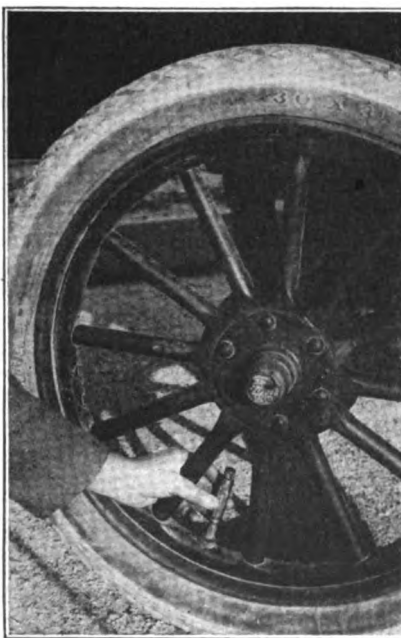
A good method is to start the motor and to turn off the gasoline until the engine begins to miss, on account of getting too lean a mixture, then turn the adjusting screw back until the motor is humming along nicely without the shade of a miss. For road work and climbing it may be necessary to turn on a trifle more gas. This method will save gasoline and will also assist materially in keeping the cylinders free from carbon. Some folks say that burning distillate causes an excess of carbon. Maybe it does the way "some folks" burn it. The writer has burned from one-half to all distillate for a long time and by running a very lean mixture the plugs and cylinders are cleaner than they were when all gasoline was burned,—and the lean mixture secret was not understood.

Fifth—Always keep the spark lever advanced as far as possible. The average motorist wastes gasoline by neglecting this point. Of course, when the motor is running at a high rate of speed the spark may be advanced farther than if it is idling along slowly. The observant driver will soon "get next" to how far the spark may be advanced. If the spark is not advanced enough the very fact of advancing it will cause the motor to "pick up" (increase in speed) providing it is otherwise in good running or-

der, while the same effect will be noticed by the simple retarding of the spark should it be advanced beyond the proper point. A particular pounding in the motor also shows that the spark is advanced too far. The only way a man can learn the peculiarities and requirements of his car is by experimenting—not tinkering—and a little experimenting along the spark advancing line will be sure to increase the mileage.

Sixth—Keep the engine free from carbon. By keeping down the quantity of carbon in the engine not only will gasoline be saved, but the motor will run smoother and will climb hills better. The valve facings should not be allowed to become pitted with small specks of carbon as this will cause a loss of compression and consequently of power, which means a wasting of gasoline.

Seventh—Brakes should not be allowed to drag. Surely every motorist realizes this, but there are a great many who seem to disregard it. A dragging brake will naturally retard the speed and progress of the car, which very act calls for a greater amount of gasoline to drive the car along at the required speed. And in addition to calling for more



USE A TIRE GAUGE—DON'T GUESS AT THE AIR PRESSURE

gas the dragging brake continually demands new brake linings. An unfortunate result of the dragging brake is that, sometimes, when the brake is needed worst it refuses to hold, this being because the linings have, without the owners knowledge, been worn away. To

ascertain whether or not the brakes are dragging, jack up the rear wheels, see that the gear shift is in neutral, then try to spin the wheels. They should spin freely and without any dragging whatever of the brakes.

Eight—Tires should be inflated to the proper pressure at all times. The right pressure is, some authorities claim, about 20 pounds to the inch—that is, a three inch tire should be pumped to 60 pounds pressure; a four inch tire to eighty pounds, etc. The best way to do, however, is to keep them pumped to the pressure recommended by the tire manufacturer. He made the tire and we must take it for granted that he knows his business. Running the tire soft will, in addition to using more gasoline, prove very injurious to casing and tube. Pumping the tire too hard will possibly result in stone bruises, which will eventually result in blowouts.

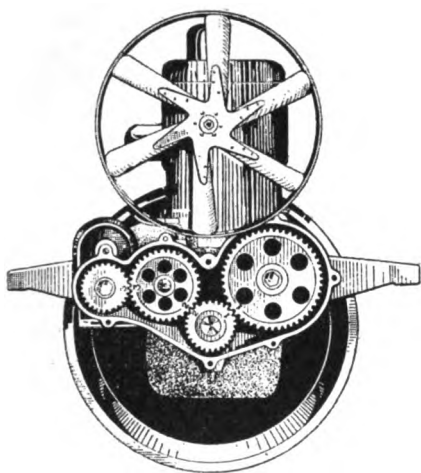
Ninth—Get an efficient gas saver. We realize that there are many folks who unconditionally condemn patented gas savers, while there are others, who have given them a thorough test, who would not be without them. Personally we know that some gas savers do actually save gasoline. The very fact that at high speeds the car will run on proportionately less gas than when traveling at slow speeds, shows beyond a doubt that anything that will automatically feed less gas as the engine increases its speed—in fact, feeding all the air the motor will take without misfiring—cannot help but cause a saving of gasoline. The patented and advertised gas savers all have more or less merit. We are using a gas saving apparatus which screws into the intake manifold of the engine. The apparatus is operated by means of a steel cable, run in a flexible pipe, from the steering post. By using this device we can be sure that the motor is getting all the air it will accommodate at all times. These gas savers actually give 10, 15 and even 20 per cent. more mileage per gallon of gasoline than could be secured without them, and therefore should not be overlooked.

Regardless of the make of car the motorist owns he will doubtless get more miles out of the gasoline used if he will heed the foregoing rules. Then, too, the car will run smoother, last longer and the upkeep expense of the machine will gradually grow less, not to mention the ever-increasing width of the owner's smile, which is bound to appear.

Ignition Timing and Valve Setting

VERMONT WELLS

It seems that it would be a good idea to give a few instructions in regard to timing the ignition on some of the different cars as there are a good many repair men that do not seem to be able to do this properly and it is necessary sometimes to remove the generator, timer unit, or the timer gear case cover in the front of the motor. Sometimes a gear will break up in the front of the motor or a chain will break and of course this will



MARKED GEARS FOR REMESHING
TIMING GEARS

change the timing of the motor. Most always one will find the gears marked and then again there will be no marks on them or there will be so many that you will not know which are the right ones.

To time the ignition on the Hudson Super-Six model M proceed as follows—Have the spark lever on the steering wheel at the top and be sure that it works the timer, sometimes the rod becomes unhitched. Open the priming cocks on the engine, and put on the starting crank, turn the crank slowly until the front cylinder begins to blow air out, this means that it is on the compression stroke. You can easily tell this by holding your thumb over the cock. The front cylinder should fire in the advanced position, just as the mark A on the flywheel reaches the pointer that is attached to the crank case. These marks may be seen through the inspection hole on the flywheel case at the left side of the motor.

The mark A is one-half inch before top center. Top center is

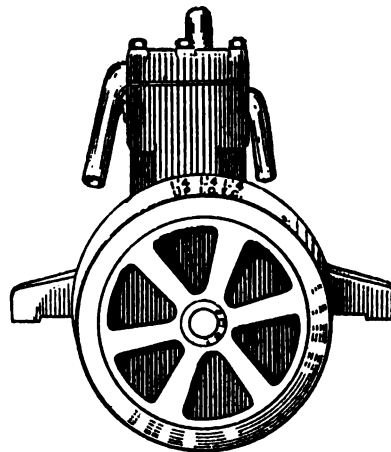
marked D-C-1&6. Now loosen the cam in the distributor and set to break at this point. Be sure and tighten the adjusting screw after making this adjustment. The spark happens just as the points open. This is the only one that you need to change for if you get one right the other cylinders have to be.

The method used in timing the ignition on the Overland Light Four is a little different.—Have the spark lever on the steering wheel fully retarded or as low down on the quadrant as it will go. The points in the timer should break just as the dead center mark on the flywheel is one inch past the mark on the rear end of the motor block. With the flywheel in this position the distributor short circuiting member should be in alignment with the center high-tension electrode of the terminal of the wire which leads to the spark plugs in the cylinder in which the piston has just completed the compression stroke. To find which is the compression stroke, turn the motor over until the exhaust of the cylinder in question, has just reached its seat in the motor block, you can tell when this happens by taking the cover from over the push rods and as soon as there is clearance between the push rod and the end of the valve stem, you will know that the valve is on its seat. Now turn the motor over one-third of a turn, or nearly that, until the marks 1-4 Up or 2-3 Up is in the upper most position. If the pet cock is opened the compression stroke may be determined by feeling the pressure of the air that is blown from the cylinder, as the piston reaches the top center. With the flywheel in this position reinstall the timing unit as directed.

On the Franklin car series 9 the Atwater Kent Ignition System is used, and the unisparkar is set so that it fires at one and one-half inches advance, measured on the flywheel. This has been found to be the best place by the Franklin people and should not be changed. To check the timing to see that it has not been changed, remove the distributor cover and turn engine over slowly until click of contact maker is heard. Stop at this point and take up the floor boards and see if the marks C.L.1-6 are one

inch and one half by the center of the last cylinder. If for any reason the unisparkar has to be reset, proceed as follows,—

Turn the flywheel until No. 1 cylinder finishes the compression stroke and the 1-6 mark on the flywheel is one and one-half inches ahead of the center of the No. 4 cylinder, loosen the clamping screw in the aluminum base plate of the unisparkar so that the body can be turned in its bearing. Do not loosen it so that it turns easily but have enough tension on it so that it goes rather hard. Slip the unisparkar worm gear back into mesh so that the distributor arm is in the correct position for firing No. 1 cylinder. Screw the aluminum base plate temporarily to engine base so that it cannot turn, then turn the unisparkar slowly anti-clockwise until the click of contact maker is heard. Stop at this point and try the cover on to see if the distributor arm is opposite the segment leading to terminal for No. 1 wire. If it should be on another wire the worm gear will have to be changed to another tooth and the unisparkar turned until the click is heard again. After this comes in the right position, adjustment should be checked by moving the flywheel backwards about 16 inches on the flywheel rim, so that it is off the firing point again, and



FLY-WHEEL MARKINGS

stop the moment the click is heard. If C. L. 1-6 is then one and one-half inches ahead of the center the unisparkar is set right. It should now be lifted out of mesh to tighten and re-wire the clamping screw in the base plate.

To time the ignition on the Jeffery Chesterfield Six, proceed as follows,—Fully retard the spark lever on the steering wheel. Take off the cover of the breaker box.

spark and to the left to retard it. Have the spark lever about one inch down from the full retard position and turn the collar to the right a little at a time until the contact points just break apart, then tighten the set screw. Be sure to see that the distributor arm is in line with the contact leading to the number one cylinder.

The Jackson Car, Wolverine "349", should be timed as follows,—Turn the engine over with the hand crank until the piston of the right front cylinder has reached the top of its compression stroke. The flywheel rim is marked with a center line which when brought central with the opening on top of the flywheel case indicates that the piston is on the top dead center. Be sure that the piston is on the compression stroke, and you can be sure by placing the thumb over the priming cock when it is open and tell when the air stops blowing out. Turn the engine slowly until the center line on the flywheel is $\frac{5}{8}$ of an inch past center. This brings the piston in No. 1 cylinder in the position where the spark should occur when fully retarded.

With the lever at full retard and the engine set $\frac{5}{8}$ of an inch past center, with the piston at the top of the compression stroke, the cam should be just opening the circuit breaker contact points. For making an adjustment the cam may be pried off the taper end of the shaft by means of the tool furnished, rapping the cam to loosen it from the shaft, after unscrewing the nut which holds the cam down on the taper. Be sure that the distributor terminal on contact leads to the right front cylinder. The spark plug wires should be connected in the following order around the distributor counting in a clock wise direction, 1-R, 1-L, 3-R, 3-L, 4-R, 4-L, 2-R, 2-L. This is the firing order.

The instructions for timing the ignition on a Buick 1918 Six cylinder, follow,—Have the spark lever in the retarded position on the steering wheel. Turn the engine to the seven degree mark, which is about one inch past the dead center, with the No. 1 cylinder on the firing stroke. Loosen the timing adjustment screw in the center of the distributor shaft and turn the breaker cam so that the rotor button will be in the position under No. 1 high tension terminal when the distributor head is properly located. This determines the proper lobe of the cam to time by. The cam should be very carefully located so that

when the slack in the distributor gears is rocked forward the contacts will be opened by the cam, and when the slack is rocked backwards the contacts will just close. Tighten the adjustment securely and replace the rotor and distributor head properly located by the tongue in the hold down clip. The firing order is 1-4-2-6-3-5.

Next Month—Saxon Six, Chevrolet, Chalmers 6-30, Dodge, Maxwell, Chandler Light Six, Chevrolet 490, Cole Eight, Studebaker, Cadillac Eight, Locomobile and Metz.

LAST CALL FOR THE EXPOSITION

The United States Navy has developed on the Municipal Pier in Chicago, one of the most important of all naval training stations, a school for the making of ensigns and quartermasters to man the new ships which Schwab and Hurley and the ship builders are turning out in record-breaking time. And the thousands of visitors at the National Truck, Tractor and Automobile Equipment Exposition, September 14 to 21, will probably divide their interest equally between the north half of the immense pier, which will shelter the Exposition, and the south half, which shelters the budding sailors.

The quarters of the future ensigns and quartermasters have been established in ship formation on two decks of the great pier, and nautical terms are in use. For example: floors are called decks, and left is port while right is starboard. Blue jackets armed with bayoneted rifles patrol the decks and no one gets past them on the south half of the pier except at visiting hours.

Nevertheless there will be plenty of opportunity for exposition visitors to hear the crack band recently organized by the school, and which already takes rank with the famous Jackie band of the Great Lakes naval training station. The band will give concerts in the big auditorium on the pier and on the promenades with which this \$5,000,000 recreation center is provided. It will also be possible to watch the jacksies at their drills, for the mile long roadway which separates the north and south sides of the pier is being utilized as a drill ground.

That the Pier will be the center of "class" in Chicago the third week in September, while the big Exposition is on, goes without saying, for the young men who are

admitted to the naval training school there are all carefully selected from among thousands of applicants. They must have at least a high school education, and the majority are college men, many of them leaders in college activities, but all working like trojans to learn the ins and outs of the most important game they ever played.

And on the other side of the pier will be assembled the "class" of America's trucks, tractors and accessories. Manufacturers and distributors are taking keen interest in this great showing of war-time equipment; and farmers, threshermen, hardware men and local dealers from all over the country have written that they would not miss this exposition for any consideration.

SHOWS, RACES, DEMONSTRATIONS

Oakland, Cal., Sept. 9-Oct. 6—Pacific Coast Land and Industrial Exposition. Civic Auditorium.

Chicago, Ill., Sept. 14-21—National Truck, Tractor and Accessory Show under the auspices of the Automotive and Accessories Exposition, Inc., Municipal Pier. H. V. Buelow, manager.

Montreal, Can., Sept. 17-19—Farm Tractor Demonstration for Eastern Canada.

New York, N. Y., Sept. 21—Racing Meet, Sheepshead Bay, auspices Sheepshead Speedway Motor Club, Inc. (Sanction pending.)

Detroit, Mich., Sept. 23-4-5—Convention, National Association of Purchasing Agents; Hotel Pontchartrain.

Cincinnati, O., Oct. 6—Racing Meet.

Dallas, Tex., Oct. 14-27—Seventh Annual Automobile Show; Texas State Fair.

Ottawa, Ont., Oct. 16-18—International Plowing Match and Tractor and Farm Machinery Demonstration. Experimental Farm.

Chicago, Ill., Oct. 28-Nov. 2 Convention and Automotive Equipment Exhibit, National Association of Automobile Accessory Jobbers.

Des Moines, Ia., Dec. 2-5—Tractor Show in connection with Convention of the Iowa Implement Dealers' Association.

Kansas City, Mo., Feb. 10-15, 1919—National Tractor Show, auspices Kansas City Tractor Club; Guy E. Hall, Secretary.

Looking backward has been considered poor business ever since that historic occasion of Lot's wife.

If you do things you can honestly take pride in yourself, others will come to appreciate your work in the course of time.

The Care and Repair of Automobile Starting and Lighting Batteries

Storage batteries must be charged from direct current. If only alternating current is available, this must be converted to direct current by a rectifier or motor generator set.

Charging from Direct Current Mains—Where direct current is available it is usually of high voltage compared to the voltage of an automobile starting and lighting battery and apparatus must be used to obtain the proper voltage across the battery terminals, unless a considerable amount of charging can be done in series.

The insertion of a bank of lamps between the source of supply and the batteries as shown in Figures 7, 8 and 9; is the lowest in first cost, but an uneconomical method of charging.

The proper lamps to use are 32 candle power, 120 volt carbon lamps. These will permit a current of about one ampere per lamp so that the number of lamps in parallel will determine the charging current.

If desired the bank of lamps may be replaced by a rheostat as in Fig. 10. While no more economical, this method is more convenient than the lamps as it is only necessary to turn the handle of the rheostat to obtain the charging current desired.

When charging either through a bank of lamps or through a rheostat, batteries of about the same capacity should be charged in series Fig. 11, rather than in parallel, Fig. 12.

Note that although the same current is going through the bat-

teries in Figs. 11 and 12, twice as much current is coming from the charging source in Fig. 12 as in Fig. 11.

Charging Rate—In charging a number of batteries in series, the charging rate should be that of the battery of the lowest capacity.

Economy—The methods of charging before mentioned are uneconomical unless a considerable number of cells (20 to 40 on 110 volts) can be charged in series at one time,—as otherwise the greater

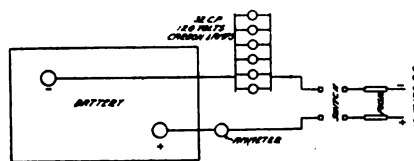


Fig. 7
Charging through Bank of Lamps on 110 Volt Circuit

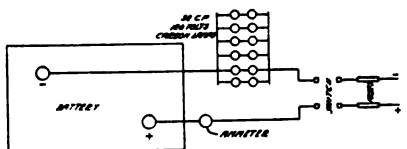


Fig. 8
Charging through Bank of Lamps on 220 Volt Circuit
In this case two lamps are used in series.

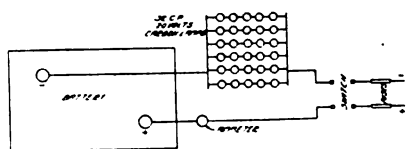


Fig. 9
Charging through Banks of Lamps on 500 Volt Circuit
In this case five lamps are used in series.

proportion of the current is lost in the resistance. Under ordinary conditions it will be found best to install a motor generator set to transform the current to the proper charging voltage.

Charging from Alternating Current Mains—When only alternating current is available, it must be transformed to direct current for charging; either by the use of an alternating current rectifier or a motor generator set, preferably the latter. Full information on charging outfits can be obtained from any of the large electrical manufacturers. In asking for information on the subject be sure to state the voltage, cycles, or frequency, of supply current and whether single or three phase and give the number of six volt batteries to be charged at one time.

Battery Charging—Batteries brought to a service station to be charged are usually completely discharged and often times have been allowed to remain in a discharged condition long enough to collect considerable hard sulphate on the plates. For this reason it is well to charge the battery at a very low rate in order to bring it back to normal and that it may receive a full charge.

(Different charging rates are recommended by different battery manufacturers for their different sizes and models of batteries and they will gladly furnish charging tables to interested persons on request.)

The initial charging rate may be continued for five hours and then the charging current should be lowered to the final rate and continued at this rate until the battery is fully charged.

If, while charging at the initial rate the cells commence to gas freely, the charging current should be lowered to the final rate. If the temperature rises to 110 degrees the charge should be discontinued until the temperature falls to 100. degrees and then continued at the final rate.

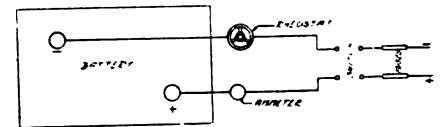


Fig. 10
Charging through Rheostat

The charge at the final rate should be continued until the cell voltage and the specific gravity of the electrolyte has remained constant for five hours.

THE REMEDY

Partial solution of the problem lies in the extension of the Rural Motor Express Lines now in operation and the organization of new ones.

Farmers, truck gardeners and dairymen find that motor truck lines assure quick, daily transportation to market and enable them to devote all their time to their farms.

This encourages them to increase production and compensates for the loss of farm labor.

Motor express lines afford opportunity for profitable enterprise.

Using the above formula an empty battery should be fully charged in approximately fifteen hours.

Be careful that the positive pole of the battery is connected to the positive pole of the charging circuit. If there is no voltmeter of

THE CONDITION

The safety of our country depends on transportation.

Railroads are so congested they cannot carry all our food and other supplies.

Farmers hesitate to produce to capacity, fearing their produce cannot be marketed.

Large quantities of farm produce do not reach market because of lack of transportation and are therefore wasted.

About 20 percent of farm help has been lost by draft and other causes.

Therefore transportation must be provided if our country, our army and our allies are to be fed.

sufficient range to read the polarity of the charging circuit, this polarity may be determined as follows; Mix a teaspoonful of salt in a glass of water. Insert the ends of the leads from the charging circuit into the water. Bubbles will be given off the negative lead.

The vent caps should be removed from all batteries while charging.

Even up the electrolyte to 1300 by adding 1400 acid solution if the electrolyte is low and by adding pure water if the electrolyte is high.

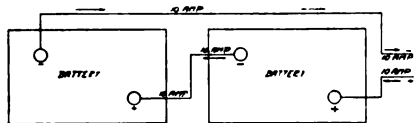


Fig. 11

Charging Two Batteries in Series

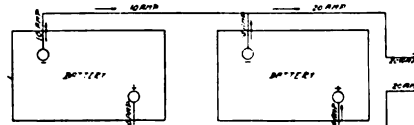


Fig. 12

Charging Two Batteries in Parallel

Screw the vent caps tightly into place and clean the battery with ammoniated water. Grease the terminals with vaseline or heavy grease when charge has been completed.

To charge a battery at normal rate requires about 24 hours. If it is desired to complete the charge in a less time the charge may be started at double the normal rate, but must be reduced as soon as the cells start gassing. The temperature must also be closely watched.

Storing Batteries—When a battery is brought in for storage, it should be first tested carefully, as outlined previously.

If the battery is six months old or less and the test shows it to be in good condition, it should be fully charged, filled to the proper height, and the electrolyte should be evened up to 1300.

Thereafter, it should be charged, if possible, every month and at least once every two months, at the final rate prescribed for the battery. This freshening charge need only be for two or three hours, until the cells gas freely and the gravity reaches 1270 to 1280.

When the battery is to go into service it should be charged at the final rate until the specific gravity of the electrolyte and the voltage of the battery remain constant for a period of five hours. The solution should be brought to the proper height, and the gravity of the electrolyte to 1300.

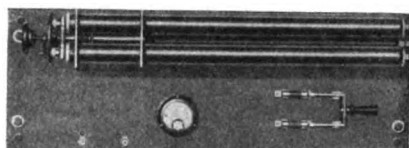
If the battery is over six months old and is to be stored for an indefinite time, or for a period of three or four months, the user should be notified that in all probability the battery will need new separators shortly after it goes into service and that it would be advisable to him to have the battery stored dry and have new separators installed just before he wishes to use the battery.

Dry Storage—The battery should be fully charged as previously mentioned.

The elements should be removed and the wood separators discarded. Also discard the old electrolyte.

Soak the positive and negative groups in cold water for at least 15 minutes. Positive groups can then be laid aside to dry. The negative groups will probably heat when removed from the water and they should be re-dipped until they cool off. The parts can now be stored in a dry place, care being taken not to let the positive and negative elements come into contact with each other.

When the battery is reassembled as will be discussed shortly the electrolyte in the cells should have an initial density of 1300.



CARBON RESISTANCE CHARGING PANEL

New batteries carried in stock should be given an occasional freshening charge, as recommended for batteries in storage.

Terminals and terminal connectors of stock batteries should be well greased to prevent corrosion.

VULCANIZERS AND FIRES

In the daily news reports from all parts of the country concerning the activities of garages and repair shops that we receive there is an alarming number that tell of fires that have originated "in the vulcanizing department" or from "a vulcanizer".

The latest of these comes from Kansas where a \$50,000 fire was apparently the result of someone's carelessness in leaving a burning vulcanizer unwatched. While the loss in this case is large it falls all the heavier because there was no insurance on either the large stock of automobile parts and accessories

or the building and its contents.

There is nothing particularly dangerous about a vulcanizer when intelligently used and watched while in use. But there is a potential fire started as soon as the operator turns his back on it.

Considering the inflammable character of the average building devoted to auto repair and storage purposes and add to this the fact that they are more or less saturated with oil and grease and the folly of leaving any open flame of whatsoever description about the place without all adequate safeguards is easily understood.

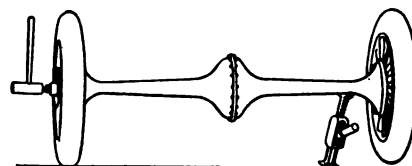
The insurance question has been brought up so many times that when one reads;

"The loss is carefully estimated at something over \$50,000. K. B., it is asserted, carried no insurance and their loss is total" that one feels profound sympathy for the loser but at the same time he marvels at the carelessness of a man or firm who would make a \$50,000 investment and take no means to protect himself against loss.

As we have already said, the number of fires that occur and that are attributed to vulcanizers, is alarmingly large and it would be safe to estimate about 75 per cent of garage fires as resulting from this one cause and naturally one must come to the conclusion that one of several things should be done, the most sensible and practical of which would be to install the vulcanizer in a small building apart from itself where, if it did burn up it would not entail the loss of thousands of dollars worth of property as represented by stock, building, tools and the expensive automobiles of other people.

REMOVING FORD WHEELS

Jack up the opposite wheel from the one it is desired to remove about an inch from the floor so it will draw the weight of the car away from the



wheel to be removed, then, with a lead or other soft hammer, give the end of the axle a few good jolts. In case there is no soft hammer in the shop a piece of lead or copper can be held between the hammer and the axle.

—U. G. MILLER, Pennsylvania.

WHEN BANKS DEMAND EXCESSIVE INTEREST ON LOANS.

R. H. Butz.

It has been found that occasionally some business men are required to pay more than the legal rate of interest on the money they borrow from their banks. While this practice is not general among bankers, still there are enough instances of this sort that it will be worth while for the man who borrows money to know how to protect himself against the illegal methods of the usurer. Every business man knows that usurious practices are unlawful, but he does not always know that he can penalize the usurer in a most drastic manner.

Excessive interest charges are not always in the form of direct payments of interest to the bank; in fact, in very few instances is this the case. There are various other subterfuges that have been resorted to in the hope of evading the penalty for usury as prescribed in the Federal statutes.

One method, perhaps more commonly resorted to than any other, is to require that part of the money borrowed be left on deposit in the bank. Thus, a man may ask a banker to discount his \$5,000 note. Suppose the banker agrees to discount the note, but only on condition that \$1,000 of the proceeds remain on deposit in the bank. This method is nothing less than usurious. The man pays interest on \$5,000 but receives only \$4,000 for his use, while the bank receives interest on the \$5,000 and also on the \$1,000 which it may again loan to another party.

The law on this point has been stated very plainly in the following manner: "In the case of loans or discounts by a bank at the highest legal rate of interest, a provision that the proceeds of the loan shall be kept as a deposit in the bank during the period of the loan renders the transaction usurious for the reason that the borrower thus pays interest on money which he does not receive or have the use of. But the fact that the borrower voluntarily allows a part of the loan to remain on deposit with the banker will not constitute the giving or taking of usury, though such deposit is made with the expectation by the borrower that he will thereby be enabled to obtain further loans more readily."

Then there is the old device of a bank or individual "buying" a note at a considerable reduction from its

face value. This also constitutes usury, and no business man, however hard pressed he may be, should allow anyone to defraud him in this manner. Some borrowers have paid as much as thirty per cent on money in this manner.

As proof of the fact that banks may be penalized very heavily for resorting to usurious methods, the following instance will demonstrate: In this instance a business man named McCutcheon borrowed money from the Marine National Bank, and although his business with this bank was very extensive and involved many transactions, he maintained that he was required to pay more than the legal rate of

OH, WELL, THEY STARTED IT.

A contributor, who has recently passed through Germany, gives the following information.

"Germany is almost without rubber. Germany used to talk glibly of synthetic rubber, but it has apparently not materialized. At all events, rubber tires have long since disappeared. The 'popular' tire today is a resilient metal rim.

"Private use of cars has long since been suppressed, and even motor cabs have vanished from the streets.

"Shortage of copper and copper alloys alone would have discouraged motoring, for the metal enters largely into the construction of quite a number of motor parts. The shortage has been so acute that all copper in domestic use, as well as brass, has been requisitioned. Door knobs, bell pushes and pulls, knockers, kettles, everything of this 'precious' metal, —even electric light wires, have been taken over for munition. In many cases, zinc has been used as a substitute, and zinc is now being called in."

interest on the money that he borrowed from the bank; that when his indebtedness to the bank amounted to \$85,000 he was required to pay interest on \$100,000. The case was finally settled out of court, the bank paying McCutcheon \$17,000 which was practically twice the amount of usurious interest that the bank had received.

The National Bank Act (revised statutes) provides that a national bank may charge on any loan interest at the rate allowed by the laws of the state in which the bank is located, except that, if by the state law a different rate is limited to banks of issue, that rate shall be allowed for national banks in the state. If no rate is fixed by the state law, the bank may charge a rate not exceeding seven per cent., which may be charged in advance.

Knowingly accepting a higher rate than is allowed is penalized by forfeiture of the entire interest; and if higher interest has been actually paid, twice that amount may be recovered, as was illustrated in the case mentioned.

Another case involving usurious practices is taken from 32 N. Y. 119. In this case the East River Bank, the plaintiff, held the overdue note of Hoyt and Brother, the defendants, which the defendants wished to pay. The East River Bank proposed to discount defendant's notes for \$1,500 on condition that \$1,000 of the proceeds should be appropriated in renewal of the overdue note, and that \$500 should remain on deposit until the discounted note matured. Defendants were further required to leave with the bank their check for \$500 to meet the note in suit at maturity. The plaintiff bank discounted three notes of \$500 each and placed the proceeds to the credit of Hoyt and Brother, who then gave their check payable at maturity of the note in suit. According to the state law the note was held void for usury, the court saying:

"If the statute prohibiting usury can be evaded by such a subterfuge as has been offered in this case it has become a dead letter. By such a contrivance an individual or bank, in the loan of one-half of their capital, may draw interest upon the whole. The device in this case lacks even the merit of ordinary skill in its consummation. It is an act of cupidity and extortion that is not provided with even the decency of a cloak to cover its nudity."

When a bank makes a loan or discount and intentionally reserves or receives more than the lawful rate of interest, there is usury, no matter what may be the form of the transaction. What is of importance is the substance, not the form. Everything depends upon whether the banker receives or contracts for more than the lawful rate of interest—not upon the number of papers signed by the parties. This rule is applicable to all corporations and individuals; to all banks, state and national.

(Copyright, R. H. Butz.)

CLEANING DULL FILES

If a file persists in keeping dull, dip it in gasoline and then scrub it thoroughly with a good stiff wire brush. Keep this up until the dirt in the secretions of the teeth is cleaned out. To prevent further dirt clogging, rub the file liberally with chalk or soapstone.

Buggies and Spring Wagons Standardized

RULES for the standardization of spring vehicles comprise the latest schedule issued by the War Industries Board as part of its program of conservation by the elimination of surplus types and the standardization of farm implements and farm types. This follows the schedules on wagons, announced during recently. The new schedule is as follows:

Standard Tread:

The manufacture of all vehicles to be restricted to one standard tread of 56-in. measured from center to center of tire on ground.

STANDARD BUGGY.

All buggies to be made of one standard type in accordance with the following specifications:

Wheels: $\frac{3}{4}$ and $\frac{7}{8}$ x30-43, 6 $\frac{1}{2}$ -in. hub, F-8 No. 1 flange, $\frac{1}{2}$ -in. tire.

Gear: Spread reach style only.

Axles: $\frac{1}{2}$ -in. fan-swedged, 1 $\frac{1}{2}$ -in. true arch, with 6 $\frac{1}{2}$ -in. standard spindle, box and nut. One universal pattern for all manufacturers.

Springs: 36-in., 3 and 4-plate as standard.

Fifth Wheel: 12-in.

Body Hangers: All metal or Bailey 3 $\frac{1}{2}$ -in. drop, or wood bars and loops, 5-in. drop clipped on.

Axle Clips: Flat style.

Reach Irons: Flat, 3/16x $\frac{3}{4}$ -in., round edge.

Body: 20 and 23-in. bottom measure by 55-in. long at bottom, 6-in. panels on 20-in. body and 6 $\frac{1}{2}$ -in. panels on 23-in. Body hangers, toe rails, dashes and boots to be of two sizes only.

Seats: One low back seat in two widths and one high back seat.

Sockets: Three-bow metal straight sockets only, no handy and 4-bow sockets; no leather covered sockets.

Shafts: Plain or common eye, "common" finish, 21-in. heel, 44-in. out-to-out of heel.

Paint: Black to be regular. Eliminate all other colors possible.

Steps: 6-in. drop, 5 $\frac{1}{2}$ -in. projection, 3 $\frac{1}{2}$ x4 $\frac{3}{4}$ -in. pad, 6-in. center to center of holes, 3-prong style.

SPRING WAGONS.

Spring wagons to be made in two standard types, viz., a light spring wagon (No. 021) and a two-seated spring wagon (No. 034) the specifications governing their manufacture to be as follows:

Light Spring Wagon:

Body: 32x76-in. outside, 6 $\frac{1}{2}$ -in. panels; hardwood rail. Drop end gate; fastener No. 5697-D; hinge No. 5820-C; wood dash with rail; removable seat; iron corners on seat and body. All body irons standardized to one size for each purpose served.

Axles: Hess, No. 13, 1 $\frac{1}{4}$ -in. sq.; slight arch; wood cap on front axle only; 1 $\frac{1}{4}$ -in. double reach; shackles, No. 30110; stay braces, 26x $\frac{1}{2}$ -in. round; 1 $\frac{1}{4}$ -in. between holes.

Axle Accessories: One style clip, axle wood caps, fifth wheel, and all other parts attached to the axle. All parts attached to axle to be one kind and size for each purpose served.

Springs: 3-spring gear. Front, one, 1 $\frac{1}{4}$ -in., 4-leaf, 34-in. Rear, two, 1 $\frac{1}{4}$ -in., 3-leaf, 34-in. Spring chair No. 6615-B.

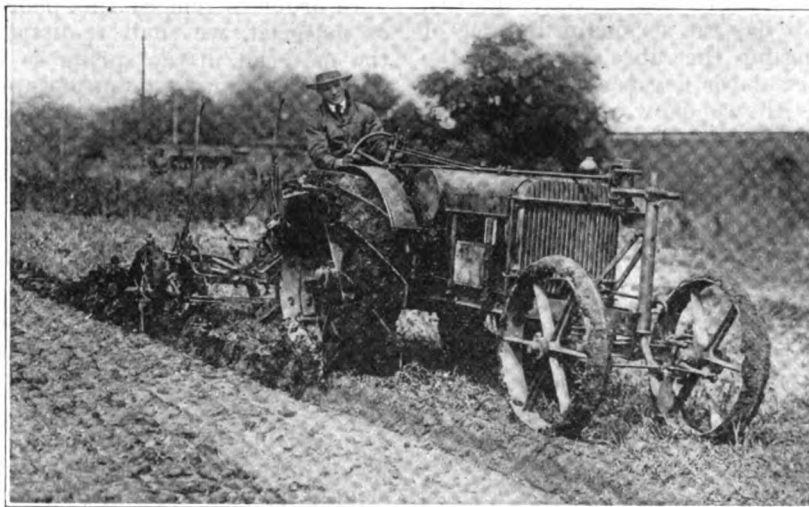
Fifth Wheel: Full circle, 11-in. malleable, No. 891-B.

Wheels: 1-in., 30-43-in., 5/16-in. tires, No. 3 flange.

Shafts: 1 $\frac{1}{2}$ x2-in. Pioneer No. 4.

THE LATEST AVERY MODEL

The latest member of the Avery family of tractors is a 5-10 horsepower tractor known as Model B and is designed particularly for small farms of 50 acres or less, for



THE NEW AVERY MODEL B TRACTOR AS DESIGNED AND BUILT FOR THE SMALL FARM IS A VERY SUBSTANTIAL AND BUSINESSLIKE APPEARING MACHINE

Poles: One size pole for each type of spring wagon.

Seat: Skeleton back.

Miscellaneous: Steps, 1 pr. No. 1930-A; rub-wear irons, 1 pr., No. 1630; irons for attaching seat to body Nos. SS-39-D, 4833, 4834, 6403-B.

TWO SEATED SPRING WAGONS:

Body: 36x90-in. outside, 8-in. panels; hardwood rail, drop end gate; fastener No. 5697-D, hinge No. 5820-C; leather dash; removable seat; iron corners on seat and body; body irons outside center brace No. SS-474, rear brace No. 6175-A. All body irons standardized to one size for each purpose served.

Axles: Same as specified for light spring wagons.

Axle Accessories: Same as specified for light spring wagons.

Springs: $\frac{3}{4}$ platform gear; Hess No. 48, Hayes spring in front; 1 $\frac{3}{8}$ -in., 34-in., 4 and 6-plate, 5-in. opening; Hess No. 16, 1 $\frac{3}{8}$ -in. cross spring, 5-leaf, 40-in., 3 $\frac{1}{4}$ -in. opening; Hess No. 13, 1 $\frac{3}{8}$ -in. side springs, 4-leaf, 31-in. opening; spring chair No. 6615-N; spring shackle 6860-B.

Fifth Wheel: Full circle, 11-in. malleable, No. 891-B.

Wheels: 1 $\frac{1}{8}$ -in., 30-43-in., 5/16-in. tires, No. 9 flange.

Shafts: Same as for light spring wagons. Seat: Panel Back.

Miscellaneous: Steps, 1pr., No. 1930-A, also 1 pr. No. 1926-B; rub-wear irons, 1 pr., No. 1650; irons for attaching seat to body Nos. SS-39-D, 4833, 4834, 6403-B; Option No. 6398-B hand lever brake; option of pole, 2x2 $\frac{1}{2}$ -in.; Pioneer No. 3.

Spindles, etc.: All spindles and all spindle boxes and nuts for spring wagons to be interchangeable.

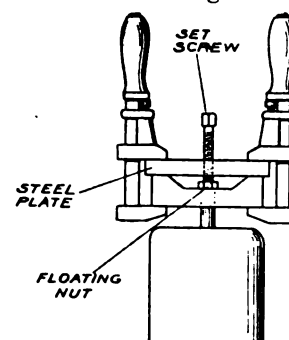
Date Effective: This schedule to become effective not later than January 1, 1919, and no vehicles or equipment differing therefrom to be manufactured after that date except for repair purposes.

truck gardening, fruit growing and for lighter work on small farms.

The motor has four 3 x 4 inch cylinders. Selective gear transmission gives speeds, 1 $\frac{1}{2}$, 2 $\frac{1}{8}$ and 4 $\frac{1}{4}$ miles per hour. Bull gears and pinions are 2 $\frac{1}{4}$ inches wide. Rear wheel 38 inches diameter, 10 inch face, equipped with five rear wheel extensions and universal lugs. Tractor turns in 10 $\frac{1}{2}$ foot radius. Tractor measures 50 inches in width and is 54 inches in height, length 135 inches with 78 inch wheel base. Weight 2,600 pounds.

PULLER FOR LIGHT GEARS

For light gears such as magneto gears, etc., two monkey wrenches and a piece of steel as long as the diam-



eter of the gear to be removed, makes a satisfactory puller. A hole is tapped through the steel bar to take a screw of about the same diameter of the shaft and a smaller nut placed on the end of the shaft to prevent bruising as shown in the drawing.

The Springs of the Car---IV.

F. M. PAUL

The effect of thickness is similar to that of width as far as deflection and load are concerned (Fig. 15), but it has the serious difference of changing the fibre stress in the material for a given deflection. In Fig. 16 we show an exaggerated case. Before loading this plate we drew a set of rectangles on its side. Bending the plate distorted the rectangles as shown. Below the "neutral axis", $n-n$, the fibres are

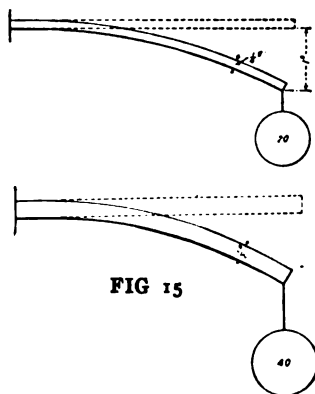


FIG 15

shorter and above they are longer than before, and therefore, the fibres of the material below the axis are compressed and those above it are stretched and the farther away they lie from the axis the greater is the action or movement. In other words, since the maximum "fibre stress" is at the top and bottom surfaces it increases with the thickness for a given deflection.

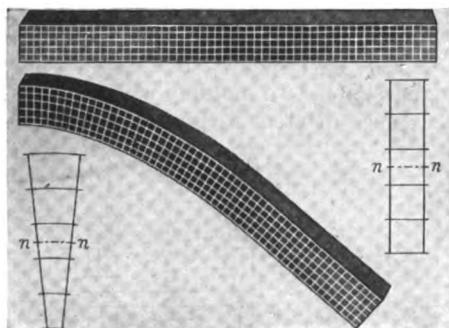


FIG. 16

There is one disadvantage common to all the plates thus far discussed, namely, they are not properly proportioned to equalize the stress when they are under load. For instance, the plates shown in Figs. 12 to 16, if loaded to the limit will always break at the points of support, as shown in Fig. 17 which means that there is too little mater-

ial at this point and too much at other points.

In order to remedy this poor use of material, we shall re-distribute the material in the spring so that most of it is at the point of support and gradually decrease the amount toward the end, as shown in Fig. 18, when we shall find that with the same total amount of material our spring will now carry twice the load that it did before. A triangular spring, such as shown in Fig. 18, is like the famous "one hoss shay", in that it has no naturally weak spot, and if it is loaded until it breaks, the rupture is just as apt to occur in one place as another. As a matter of fact it will occur at the point where the material itself is structurally weakest, and if perfect material and workmanship were possible like the "one hoss shay" it would break everywhere at the same time.

It is not convenient to design a spring of the shape shown in Fig. 18 which would be suitable for automobile purposes, and fortunately it is not necessary, since by cutting it up into strips and stacking the strips as shown in Fig. 19, we obtain a spring of convenient form which has precisely the same characteristics, strength, stress and even "stress distribution" as the triangular spring in Fig. 18 before it was cut up.

There is one important particular, however, in which the practical laminated or leaf spring in Fig. 19 differs from the triangular spring in Fig. 18 from which it is derived, namely—friction between the leaves. The friction between the leaves opposes every motion and hence tends to decrease the deflection for a given load. The leaves do not move freely and consequently the action of the spring becomes jerky and is accompanied by nerve distracting squeaks.

In service an automobile spring is in constant motion whenever the car is in use, and unless some effective method of lubrication is provided, the quality and working capacity of the springs are sure to

deteriorate appreciably with the use of the car.

Referring to Fig. 20, it is easy to see how the leaf springs that we have developed in Fig. 19 can be assembled into the various forms of springs in every day use on motor cars. By bending it upward we have a "quarter elliptic" spring; and putting two of these together, end to end, we obtain a "half elliptic", while three and

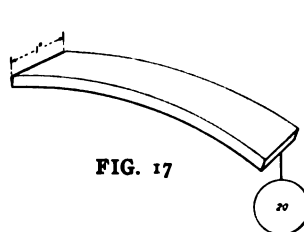


FIG. 17

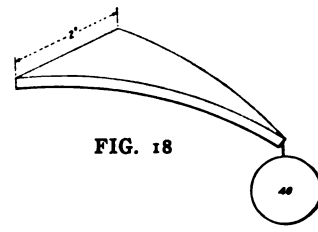


FIG. 18

four make a "three quarter" and "full elliptic" respectively.

In manufacturing this type of spring it is necessary to have a perfect fit between the leaves; and the tapering and thickness of the individual leaves must be mathematically exact as well, otherwise the action of the spring will be jerky and it will have weak spots.

From what we have said above,

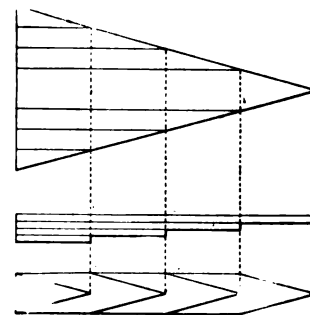


FIG. 19

it is evident that an easy riding, smooth acting, safe spring should be relatively long and flat; have a large deflection, and consist of a comparatively large number of thin leaves tapered to mathematically exact dimensions. Furthermore

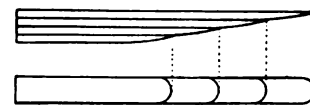
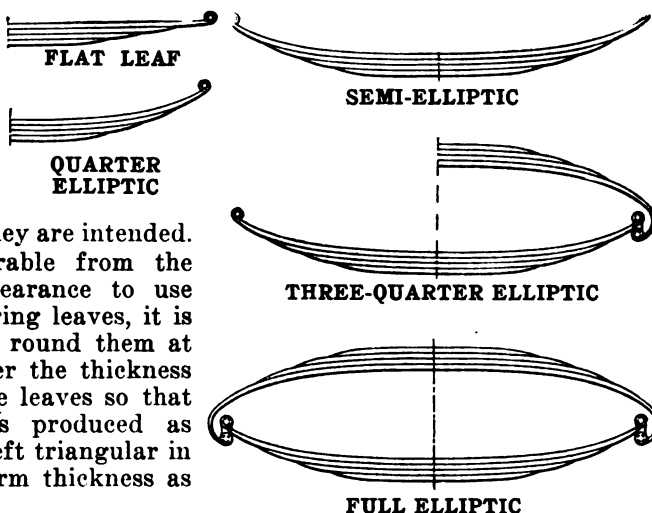


FIG. 20

it must be provided with suitable means for proper lubrication between the leaves and all wearing surfaces. Of course no one design will suit all purposes, but each special case must be treated by itself, and, if best results are to be

obtained, every dimension of the spring must be chosen with due consideration for type and weight of individual cars, as well as the service for which they are intended.

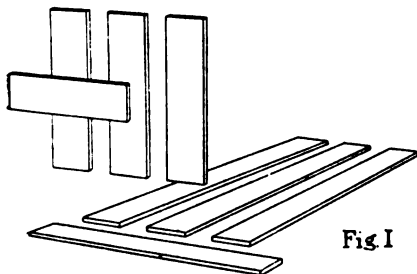
It being undesirable from the standpoint of appearance to use sharply pointed spring leaves, it is general practice to round them at the points and taper the thickness of the points of the leaves so that the same effect is produced as though they were left triangular in shape and of uniform thickness as shown in Fig. 21.



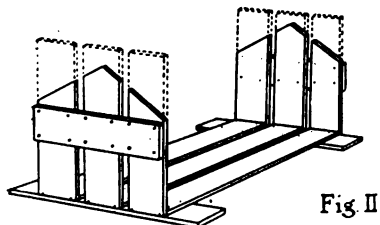
INSTRUCTIONS FOR PACKING.

To Insure Safe Transit of Storage Batteries, these Diagrams and Instructions Must Be Followed.

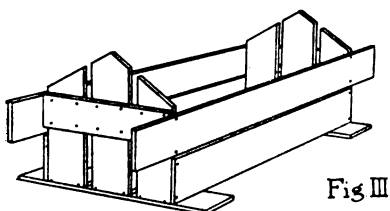
1st. The case should be built of strong lumber (1½" preferably), and of ample



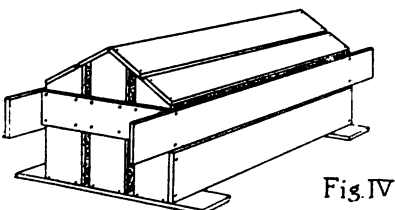
size to allow packing with excelsior top, bottom, sides and ends to a thickness of two or three inches. Nail strongly.



2nd. When the case is complete (except cover), place a thick, even layer of excelsior (or packing straw) in the bottom



and set in the battery right side up. Lay paper (preferably paraffined) over top of battery to keep it clean, then pack tightly with excelsior sides and ends.



3rd Now lay sufficient packing material on top of the battery so that cover will compress it tightly, stuffing it under cover boards as they are put on.

BOX SHOULD BE PLAINLY LABELED:



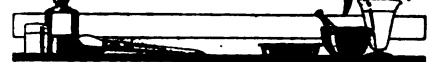
The extended boards at bottom, and the gable roof are provided to prevent the battery from being tipped over; extensions of sides for carrying.

WELDING SEMI-STEEL

In tractor and automobile welding work the blacksmith will often be called upon to weld parts made of semi-steel. The quality of this steel varies greatly and success in welding it depends upon its particular characteristic. Some semi-steel is more like cast iron; other brands approximate steel, and frequently, the operator must judge quire the same treatment. Consequence the nature of the metal so as to determine whether he will use welding rods of cast iron or Norway iron welding rod. He should use welding rod for cast iron where the nature of the metal approaches steel. In practically all other respects the welding is carried on exactly the same as welding cast iron if the metal is more like cast iron, or handled like steel if more like steel in its nature.

If a man knows his costs, he knows that he can't cut prices and continue in business.

Benton's Recipes



To Give Iron a Black Color.—To give iron a dead black color, clean all grease and dirt from the metal, and apply the following solution either with a brush or by dipping. Mix together thoroughly 1 part bismuth chloride, 2 parts mercuric bichloride, 1 part copper chloride, 6 parts hydrochloric acid, 5 parts alcohol and 52 parts water. As soon as these parts are thoroughly mixed, the compound is ready for use. After applying the compound, the iron is placed in boiling water and let remain there for one-half hour, the water being kept at the same temperature. Repeat this operation until the color is deep enough, then fix the color by placing the iron for a short time in a bath of boiling oil. After removing, heat in an oven until the surplus oil is all driven off.

Non-Corrosive Soldering Fluid.—I put any quantity of chloride of zinc in a bottle, fill it up with alcohol, and allow it to stand at least 48 hours, then carefully pour off the alcohol, mix with an equal quantity of glycerine and shake. The zinc remaining in the bottle can be used until there is nothing left of it, since the alcohol which is poured off after 48 hours contains all the chloride of zinc which is necessary for good soldering. It is not necessary to use glycerine, the office of the glycerine being merely to keep the alcohol from spreading.

Soldering Without Heat.—Take 1 ounce of ammoniac and 1 ounce of common salt, an equal quantity of calcined tartar, and 3 ounces of antimony. Pound this well together and sift. Put this in a piece of linen, and enclose it well around with fuller's earth about an inch thick; let it dry, then put it in one crucible, covered by another crucible over a slow fire to get hot by slow degrees. Keep up the fire until the contents of the crucible gets red hot and melts. Then let it cool gradually and when cold pound the mixture. When you wish to solder anything put the two pieces you want to join together on a table close to one another. Make a crust of fullers' earth, so that, passing under the joint and holding to each piece it shall be open at the top. Then throw some of the powder between and over the joint. Dissolve some borax in some hot wine, and with a feather dip in the solution and rub the powder at the place of the joint. It will immediately boil up. As soon as the boiling stops the consolidation is made. The calcined tartar is made by placing crude tartar in a covered crucible and raising it to a low red heat. Allow it to cool gradually.

Cement for Metals.—A verk good cement that I have used for cementing metal parts consists of the following ingredients: 2½ parts zinc oxide; 1 part zinc chloride; 5 parts pulverized limestone, slag, etc. Mix to a thick paste using water. If the cement is wanted to set slowly add 1 part of zinc sulphate instead of one part of zinc chloride. The adhesive power of this cement can be increased by adding 2 per cent of ferrous sulphate to the whole.

Jacob German was the first man arrested in New York city for exceeding the speed limit in a motor vehicle.

Walt Mason Orates on Motor Cars

I reckon there's no car on earth that doesn't sometimes bust a girth, that never makes a dizzy break, that has no fit or stomach ache. For cars are made by human hands, and every wise man understands that human products can not be as perfect as the sky or sea, or other products of the gods—man works against too heavy odds.

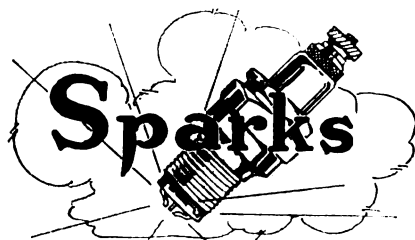
There's not, beneath the azure roof, a car that's strictly trouble-proof; and if a salesman comes along and hands you out a grand sweet song, informing you the car he sells is trouble-proof and wearing bells, oh, soak his head in yonder pond, and make him buy a Liberty Bond.

No doubt some cars are made to sell, all polished up and painted well; no doubt some cars with outside charms develop into false alarms when they take up their human load and have a try out on the road. I've had such tumbrels of my own, and they have cost me many a bone.

But there are autos built so well that trouble says a long farewell. The man who builds them says, "By jam, I want to stay right where I am, and keep on building motor cars until my spirit climbs the stars. I want to have a world-wide fame for building cars that stand the game. If I don't build the best I know, and try to make each car a go, my high ambitions will collapse, and I'll be wiped clear off the maps."

So when you go to buy a car, consider who the makers are. Have they been in the business long? Are their resources big and strong? Have they a factory of their own, where shafting hums and pulleys groan? Or do they just assemble parts and thereby break the people's hearts? Are they the kind of misfit gents who'd skin a man for fifteen cents?

To know the makers of your car, what sort of delegates they are—that is the only guarantee that's worth a bogus Scotch bawbee.



Hippopotamus meat is said to be as good as pork, but the chances are that a lot of hippopotamuses running about would muss up a back yard almost as much as chickens.

Austria—Hungry seems to be the way to spell it now.

Under the new arrangement it seems to most of us that the railroads are saving everything but time.

A rainy day job: Replace the broken window panes in the shop buildings.

The patriot talks maximum production. But there is another name for the man who talks maximum profits.

Do you ever sharpen your hoe? You'll be surprised how much easier a sharp hoe works than a dull one.

Are you a tractioneer? The more you know about the tractor, the better results you will get from it.

The federal crop report for July shows that a month ago prospects for all crops

in New York State were 4 percent better than the average. Now they are 2 percent below the average.

Love me, love my dog, may be a good bit of sentiment. But how about the sheep which some dogs love in a disastrous way? A Wisconsin Airdale valued at \$100 not long ago killed \$1,000 worth of purebred sheep. If you keep a dog, be sure he isn't a sheep killer.

It is a good thing all our prayers are not answered. If they were the angels would all want to come down here and live.

Doesn't it make you weary when a fellow can't answer a question without making a speech?

Put the Rock Where He Belongs



**FOOD WILL DO IT
EAT LESS—SEND MORE ACROSS**

The dentist, knowing something about both uppers and lowers, can go in for either the aviation or the submarine service.

You never can tell. It may be better for a man to stand on his dignity than to have no standing at all.

Aviation is like deadly poison: one drop and you're dead.

To voice opinions trouble brings, so think your thoughts, don't bray them.

What you think is your self confidence is often your self conceit.

Once in awhile you will find a married man whose idea of cruel and unusual punishment is to have to spend an evening at home with his wife.

Praise people occasionally whether they deserve it or not and you will have some sincere mourners when you die.

Fellows with a German accent had better change them to a brogue.

Just now the dove of peace seems to have been supplanted by the carrier pigeon.

Man wants but little here below and it's Mr. Hoover's business to see that he gets it.

War levels all things, it has brought about the extermination of the hobo and the dude.

With a view to extending the work or fight order, General Crowder is looking into barbers, chauffeurs, actors, circus employees and fakers. Barbers? Oh, boy; just imagine a soft little hand patting your weather beaten old cheek and a pair of baby blue eyes looking down into yours as a stream-line sister coos, "Will you have a massage, sir?" Go ahead Crowder.

The real peace note from Germany will be a howl for mercy.

There's plenty of room at the front especially over in France.

Blessings may come in disguise but trouble seldom resorts to camouflage.

What Russia needs from the United States is more safety razors and fewer commissions.

We would say that the Clown Prince has learned about all their is to know about strategic retreats.

"When I hears a man tellin' 'bout how easy he kin drive a mule", observed Uncle Eben "I knows right off he ain't no reg'lar mule driver."

Many a man has his breath taken away by a clove.

Most of us love flowers but we don't get any bouquets thrown at us until the day of the funeral.

Be polite but get all that's coming to you.

A woman is a better scout than a man. She will often brag about her husband's ability, even when she knows that he hasn't any.

The fact that he is lost in the clouds shouldn't worry the aviator. It's a cinch he'll get back to earth some way.

Another reason why we hate cats is because a cat will pass up 800 sparrows to kill one robin.

A cheap suitcase is the cheapest looking thing in the world and there is no way to make it look expensive.

It is a good bet that the wages of sin are about the only wages some people will have forced on them.

The only time a Holier-Than-Thou reformer ever doubts his Bible is when he reads that God created man a little lower than the angels. He knows that the assertion is too sweeping, because an exception was made in his case.

If you would take each man's own word for it, this world is composed of purely upright and honest men.

We like to be bunked just like other folks. But the fact that a musician looks like he hadn't had the price of a haircut for eight years never made his performance sound any better to us.

It doesn't require much of a resurrection stunt to bring the dead beat to life.

Royalty may be represented by kings and queens but Democracy is the ace.

Paradoxical as it may seem, love at first sight is what demonstrates that love is blind.

You never can tell. Many a man who never smoked a pipe in his life is a mere sham.

Many a fellow who always knows what to say fails to say nothing at the right time.

Ever notice that among women the hero worshippers are those who have never married.

There may be safety in numbers but every man is anxious to look out for number one.

Every man enjoys a reputation for being wide awake but he doesn't care about suffering from insomnia.

For every Thrift Stamp you buy Uncle Sam throws in the stamp of approval as a bonus.

Don't tell your troubles unless you have an idea that the other fellow is going to tell you his first.

It seems as though the lightest literature generally has the heaviest sales.

Uncle Sam and General Crowder have it in for the fellow who earns his bread by the sweat of the other peoples' brows.

Just because a man goes to extremes it isn't necessary for him to burn the candle at both ends.

We rise to remark that the Americans have taken the can't out of Cantigny.

Abe Martin says; "There are lots of surprises in this life but the biggest one of all is to bite on a pebble in a spoonful of beans."

Yes, war is hell all right, but it's far preferable to a German peace.

Never heard of Lincoln, Iowa? Probably not. It used to be Berlin but the citizens didn't like the flavor.

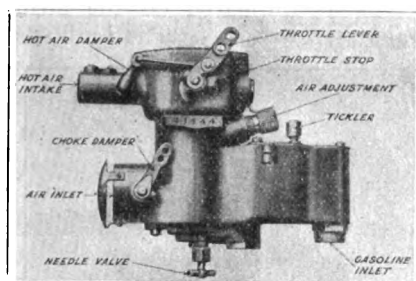
Carburetor Adjustments of Twenty Leading Automobiles

GEORGE H. MURPHY.

In the course of a year a garage man is called upon to adjust a good many carburetors and it makes it much easier for him if he has the proper instructions for doing this.

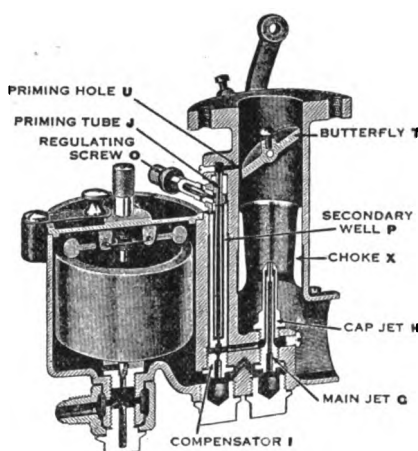
About every instruction book that comes with the car has instructions for making these adjustments, but you will not always find the book with the car. Following I will give instructions for making adjustments on a number of different carburetors and it would not be a bad idea for them to be placed on file where they can be found easily when wanted.

The carburetor that is on the 1918 Six Cylinder Models of the Buick has two adjustments, one for the gasoline that is under the carburetor, with a T handle, this is the needle valve. The other adjustment is an air adjustment and



THE BUICK CARBURETOR

the head of the screw is slotted. The first thing to do is to turn the needle valve to the right until it is closed. This turns in just as if it were a bolt or screw. Now set the air adjusting screw, so that the head of the screw is even with the end of the spring that holds it from turning. Open the gasoline adjustment by giving needle valve one full turn, as if you were going to turn it out. Start the motor and let it run until the water pipes are warm. Fully retard the spark and turn the gasoline adjustment to the right or in, until the motor idles smoothly. Advance the spark and turn air adjustment screw to the left a little at a time until the motor begins to slow down or skip, this shows that it is getting too much air; now turn to right until motor runs smoothly. It is best to test the adjustment by leaving the spark ad-



SECTIONAL VIEW OF ZENITH 0-4 CARBURETOR ON CHEVROLET 490

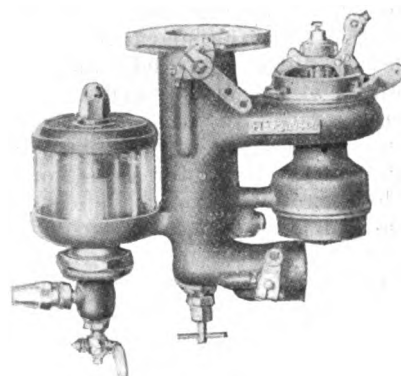
vanced and open throttle quickly. The motor should accelerate instantly. If it pops in the carburetor, open the needle valve a little by turning to the left. The air adjustment does not need to be moved to stop popping in the carburetor.

On the Chevrolet Model Four-Ninety the carburetor does not have an adjustment that can be changed. On the side there is a knurled screw that controls the low speed, but the other adjustments depend on fixed holes in two different tubes. Under the float chamber there is a plug that should be screwed out once in awhile and the filter cleaned. There are two other plugs under the carburetor that can be taken out and a very small wire run up through the tubes to clean them out. These holes are supposed to be the right size for the motor that they are on, but if for any reason one thinks that they are not, another size can be got and screwed in and tried out.

The Cole 8 has a Stromberg carburetor. Start the motor and let it get good and warm. There are two adjustments on this carburetor, the low speed, which operates on the primary nozzle, and the high speed which controls the flow of gasoline on high, by regulating the time when the secondary needle valve begins to open. The mixture at low speed is governed by the needle valve. If it is too rich the motor will sort of choke up, turn the needle

valve, which is under the carburetor with a T handle, up or anti-clockwise, this will admit less gasoline. If it is too lean it will pop in the carburetor, and the needle valve should be turned out. It is not possible to get an eight or a twelve cylinder motor to run smoothly with the spark advanced so it is best to have the spark fully retarded and the throttle closed. If the motor cannot be idled with the low-speed needle valve the throttle valve will require resetting. After the low-speed adjustment has been made, turn the auxiliary gasoline needle valve down as far as it will go. Then open the throttle and advance the spark to a position corresponding to about twenty-five miles per hour car speed and unscrew the gasoline needle until the motor runs smoothly and at the fastest speed that can be obtained at that throttle position. If motor does not respond with this adjustment as it should, screw out needle a few more notches. The auxiliary needle valve is at the top of the carburetor.

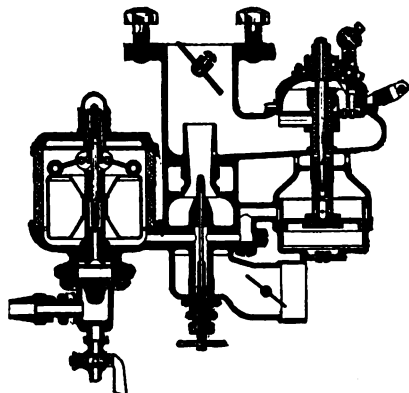
The Chalmers 6-30 has an adjustment on the dash that is supposed to take care of different weather



THE COLE 8 HAS A STROMBERG TYPE H CARBURETOR

conditions and altitude but if for any reason it will not, one can get a new adjustment as follows,—Have the motor stopped. Advance the throttle fully and set choke valve on dash at lean position and the economizer adjustment at extreme right, turn high speed adjusting screw to the left until there

is a small amount of play in the economizer lever. Turn high speed adjusting screw to the right until this play is just taken up or the lever cannot be moved without raising the needle valve. Continue to turn the high speed adjusting screw two complete turns to the right and one notch. A notch is considered the click of the locking plate in the depressions in the high speed adjusting screw. Turn the economizer adjustment to the left so that there will be about



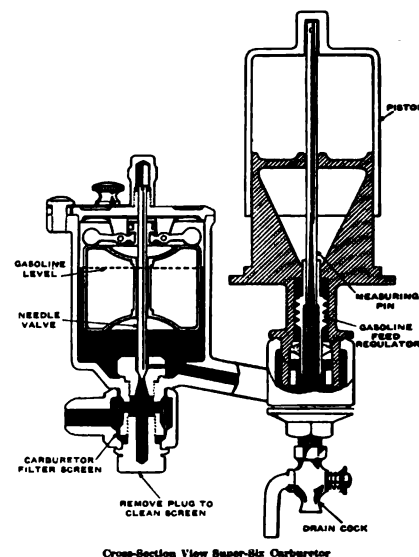
SECTIONAL VIEW OF COLE'S CARBURETOR

1/64 inch clearance between the high speed sleeve and the economizer nut. This is the approximate high speed adjustment. Turn the low speed adjusting screw to the right until it seats. Then open by turning to the left one complete turn. This is the approximate low speed adjustment. Start the motor and let it get thoroughly warmed up. This will be when the radiator is warm all over. With the spark and throttle levers fully retarded, and motor idling at low speed, adjust the low speed screw in or out so that the motor runs evenly without skipping. If the motor does not run slow enough turn the stop screw out until it does. Re-adjust the low speed adjustment so the motor fires evenly. With the spark still retarded, open the throttle quickly. If the motor pops back in the carburetor, adjust the high speed screw one notch to the right until the motor does not pop in the carburetor. If the motor does not pop back with the approximate adjustment, adjust the high speed screw to the left until it does pop back when the throttle is opened quickly. Then turn the screw one notch to the right, which will be the proper adjustment. Be sure that the clearance is 1/64 inch, after doing this. The proper setting of

the float is 5/64 of an inch travel up and down the float stem.

The Hudson Super-Six has a carburetor that is made by the Hudson people. They say that the screen at the base of the float chamber should be cleaned out every once in awhile and drain off any water or sediment that may have accumulated below the regulator. The gasoline measured out by the measuring pin may be varied by the gasoline feed regulator which is connected to the lever on the dash. In cold weather there should be a little richer mixture and in warm weather it may be leaner. There are no nozzles to change, no matter what the conditions require.

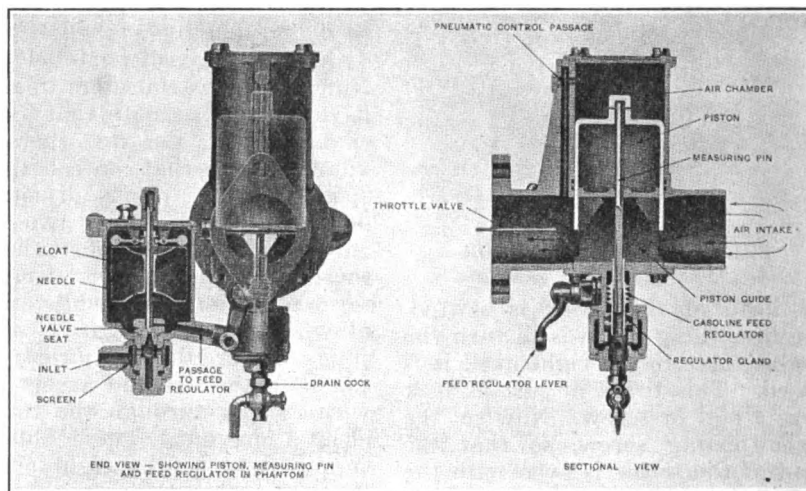
The Jeffery cars have been put out with both Stromberg and Rayfield carburetors. The Stromberg is adjusted as follows,—The float level is set and locked at the factory and does not need to be changed and the air valve spring is the same. There are only two adjustments on this carburetor, the low speed which is a needle valve, and has a T handle under the carburetor. The other is the high speed adjustment and is a knurled nut at the top of the carburetor. Before starting the motor set the high speed nut so there is at least 1/32 inch clearance



Cross-Section View Super-Six Carburetor

lean on high speed, turn the knurled nut up or anti-clockwise until the desired results are obtained. If mixture is too rich turn the knurled nut down or clock-wise. The carburetors are equipped with the proper sized nozzle and should not be changed until one is very sure that this is the trouble.

The Rayfield carburetor adjustments want to be both turned to the right as indicated on the adjustment screw heads. The high speed



THE HUDSON SUPER-SIX CARBURETOR

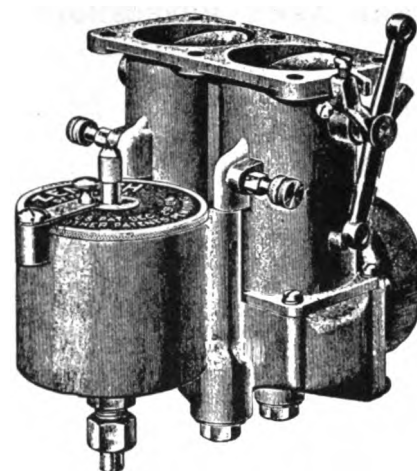
between it and the needle valve cap above it, when the air valve is on its seat. The needle valve does not begin to open until the knurled nut comes into contact with the pin headed shaped pin above it. The mixture at low speed is controlled by the needle valve with the T handle. If too rich turn the T handle up or clockwise, this will make the mixture leaner. If too lean turn the valve down or anti-clockwise. Advance the spark and open the throttle. If mixture is too

adjustment screw is the highest on the carburetor and the low speed adjustment is the one on the side of the carburetor. Always adjust carburetor with dash control down. The low speed adjustment must be finished before adjusting high. To adjust the low speed have the throttle closed and dash control down, close nozzle needle by turning low speed adjustment to the left until the little block slightly leaves contact with the cam. Then turn to the right about three complete turns.

Open throttle not more than one quarter. Prime carburetor by pulling steadily a few seconds on priming lever. Start motor and allow it to run until warmed up. Then with retarded spark, close throttle until motor runs slowly without stopping. Now with motor thoroughly warmed, make final low

is cut out. This adjustment should be done in the following manner. Take the spark plug wires from the left block first. Then adjust the right block with the slow speed adjusting nut on the right side of the carburetor until the right side of the motor fires perfectly. The knurled screw should be turned up for richer mixture and down for lean mixture. Adjust top screw on the throttle lever for the desired idle speed. Replace the spark plug wires on the left side and remove them from the right and repeat the same operation of adjusting slow speed adjustment on carburetor and throttle of this side. Be sure and have each side idle as near alike as it is possible to get them as this makes a smooth running motor.

The Locomobile people make their own carburetor and the adjustment follows.—Turn the air valve adjusting nut up until the air valve seats firmly. This will give a temporary starting adjustment. Turn the steering column adjusting collar to the full rich or starting position and start the motor. Run the motor until every thing is warm. In summer open the slide on the stove on the exhaust pipe about two inches, and in winter it should be open about one half inch. Turn the air valve adjusting nut back or forward gradually until the engine runs smoothly. The carburetor is set very lean so that good economy is obtained. The low speed setting is so adjusted that the carburetor pops when starting cold. If the carburetor is set correctly, it will be necessary to throw the steering adjusting collar around to the full rich position to keep the carburetor from popping when cold. As soon as the engine is warmed up the steering column collar should be turned back to the full lean position and left there for the normal operation



ZENITH DUPLEX CARBURETOR USED ON THE JACKSON EIGHT HAS A SEPARATE MIXING CHAMBER FOR EACH SET OF CYLINDERS

of the car and the idling adjustment should be made for this position. Under no condition drill out or change any calibrated jets or venturi tubes. Make no other changes or adjustments than above described.


There is only one carburetor on the Metz and the Ford cars. This is the needle valve that controls the amount of gas that is drawn through the carburetor and mixed with the air. To adjust this carburetor turn the needle valve down carefully until it seats, then turn it back one full turn, start motor and turn valve down until motor slows then back until it slows, about half way between these places will be about right for running. If when the throttle is opened quickly it pops in the carburetor, open the valve a little more. If the motor starts hard when cold open the needle valve a half turn and close it when warm.

(To be concluded)

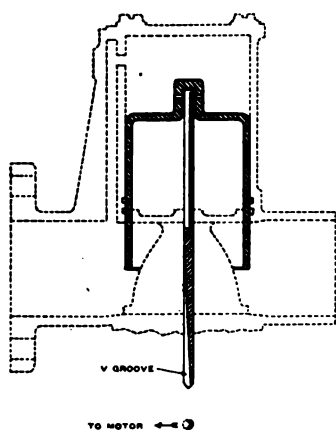
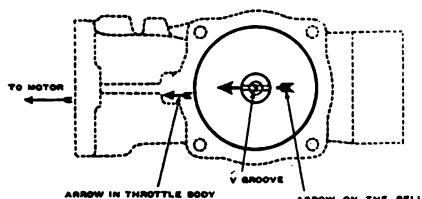
EMERGENCY STARTING

In cases where the starter is out of business and the crank handle is not available, it is possible to start the engine by jacking up the rear wheels, blocking the front wheels and then shifting into high, after which the cylinders are primed, the spark and throttle are set and the engine is cranked by turning a rear wheel. In doing this the operator should take hold of the tire rather than the spokes and must be careful not to get caught when the wheels start to revolve.

The red tape, which is complained of so much in government affairs, is also a hindering influence when it gets into industry. Keep it out.

IMPORTANT
WHEN ASSEMBLING METERING PIN AND ALSO THE AIR BELL TO THE THROTTLE BODY BE SURE THE ARROW ON THE BELL POINTS IN THE SAME DIRECTION AS THE OPEN END OF THE V GROOVE, VIZ.  AND THAT ARROW ON BELL ALSO POINTS IN SAME DIRECTION AS ARROW IN THROTTLE BODY

THESE ARE IMPORTANT FOR CARBURETOR TO FUNCTION PROPERLY

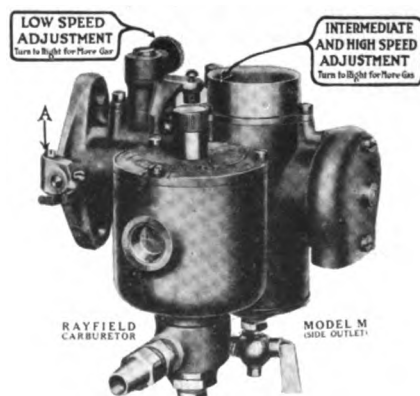


HUDSON SUPER-SIX INFORMATION

speed adjustment by turning low speed screw to left until motor slows down and then turn to the right a notch at a time until motor idles smoothly. To adjust for high speed, advance spark about one quarter. Open throttle rather quickly. Should motor back fire it indicates a lean mixture. Correct this by turning the high speed adjusting screw to the right about one notch at a time, until the throttle can be opened quickly without back firing. Adjustments made for high speed will in no way affect low speed. Low speed adjustment must not be used to get a correct mixture at high speed.

A Zenith Duplex carburetor is used on the Jackson Eight cylinder, there are no adjustments for changes of temperature and atmospheric conditions.

The only adjustment is the starting and idling jet. Each side is adjusted separately. Care must be taken in adjusting, to permit either cylinder block to run at the same speed when the opposite side



RAYFIELD MODEL M USED ON JEFFERY CHESTERFIELD SIX

THE ARMY HORSESHOER

Founder or Laminitis—Causes—The most common are concussion, overexertion, exhaustion, drinking cold water when the animal is heated, overeating and the eating of various improper foods, such as musty grain, hay, etc.

Symptoms—In laminitis of both front feet the animal is excessively lame, moves with great difficulty, especially when starting, and appears as if the entire body were in a state of cramp; he stands with the hind legs drawn under the belly and the forefeet advanced, in order to relieve the painful feet of as much weight as possible. Occasionally he may be seen to sway backward, raising the toes and throwing the weight for a moment upon the heels of the front feet, and then resuming the original position. If compelled to move, he raises the feet laboriously, not because the muscles are sore, as is sometimes supposed, but because if all four feet are not on the ground at the same time to bear the weight of the body his suffering is increased. He will often groan with pain and the sweat will break out over the body. To diagnose a case quickly the best method is to push the horse backward, when, if affected, he will elevate the toes and throw his weight upon his heels.

In some instances the animal will lie down on his side with his legs stretched out, for hours at a time evidently feeling great relief in this position; in other cases, particularly during the early period of the disease, he will stand persistently.

Treatment—Remove the shoes from the affected feet, stand the horse in hot water for several hours each day, or what is equally good and perhaps safer, apply hot flaxseed poultices, changing them every hour as they become cold. After two or three days of this treatment, change to cold water, which, can be applied either in the form of a foot bath or by standing the animal in a running stream for five or six hours at a time. As soon as the pain has diminished moderate exercise is beneficial. This may be gradually increased until the animal shows no further signs of trouble. If after five or six days, pronounced symptoms of recovery

are not evident, apply a stiff blister of cantharides around the coronet, repeating the blister if necessary. In addition to the local treatment nitrate of potash (saltpetre) in doses of 2 to 4 ounces may be given three times a day. If the horse is constipated give one quart of raw linseed oil.

After treatment use a bar shoe, well rolled at the toe and with thin heels. Use no toe clips. Concave the upper web to remove sole pressure.

Chronic laminitis is permanent laminitis resulting from one or more attacks of the acute form of the disease. In the chronic form there is always inflammation, sometimes more, sometimes less, but never as severe as in the acute form. This varying inflammation affects the adjoining sensitive structures and interferes with their continuous regular secretions. The



coronary band becomes affected and consequently the growth of horn is not steady. This is shown by the growth rings on the outer surface of the wall.

The interruption of the natural secretions of the sensitive laminae. In bad cases there is a rapid (false) growth near the toe that has not the ordinary amount of vitality and seedy toe frequently results. This extra false growth also forces the coffin bone back from its proper station, and as the dovetail attachment is not as strong as in natural growth the weight of the animal forces the coffin bone down upon the sensitive sole, causing the ailment known as **drop sole**. In very bad cases, the bone actually pierces the sole and the animal is, of course, absolutely useless.

In case of chronic laminitis, pay special care to the concaving and use a bar shoe rolled both at the toe and at the heel; this is a modified form of the rocker-motion shoe.

Seedy Toe—Seedy toe is a mealy condition of the inner wall of the hoof, the white line, and sometimes the sole. It is most frequently seen in the front feet.

Causes—Undue pressure, heavy, deep-seated clips on shoes, deep chronic laminitis.

Treatment—Pare the wall of the cavity until healthy horn is reached, and pack with tar and oakum. Stimulate healthy growth of horn by the application of cantharides blister at the coronet.

Use a bar shoe, well rolled at the toe; no nails should be driven in the diseased part, but, instead, side clips should be used, care being exercised that they bear only on the healthy horn.

Contracted Feet—Contracted feet is an unnatural shrinking or narrowing of the feet at the heels.

Causes—Lack of exercise; lack of moisture; thrush; the continued use of heel calks. As previously explained, only the sharp inside edge of the upper surface of a shoe should be rounded at the heels. The beginner is apt to hammer this surface until it is inclined inward and downward. As a result, when weight is brought upon the foot, the heels are unable to spread against this slope, and become contracted. The practice of using the knife to trim the bars, or to cut a notch at the junction

of the frog and bar at the heel (called "opening the heels" in civilian shops) always produces this trouble.

Treatment—Ascertain the cause and remove it if possible. The remedy is to get pressure on the frog. If the feet are extremely dry and hard, they may be softened by standing the animal in moist clay or in water. If the animal is to be used on soft ground let him go barefoot, or shoe with the tip otherwise use the bar shoe.

Good results are sometimes obtained by using a shoe which just reverses the fault mentioned above as causing contracted heels. If the upper surface of the shoes at the heels is beveled outward and downward, it is difficult for the foot to contract against this slope, and it is gradually forced back into normal shape. This shoe must be made with the greatest care, results must be watched daily; carelessly made or carelessly used, it is apt to produce corns.

A gospel motor wagon was constructed in 1886 for a New York pastor, in which he preached. It had capacity for ten singers and a folding organ.

The Motor Car Paint Shop---IX.



A FEW PRACTICAL COLOR HINTS

All light chrome pigments appear to better advantage over light-toned groundwork. Most of them are quite opaque, but are more brilliant when applied over fairly light grounds. Vermilions will do better on a blank white panel than on any other colors. The Milori Greens should have grounds tinted a trifle lighter than themselves.

These colors will be found more brilliant and satisfactory than any other blues now on the market as they work perfectly free and will not cloud. The following is the one proper method of handling them in order to secure absolutely perfect results, viz.: First prepare the surface with one coat of C. P. Blue Groundwork No. 213. When this is dry take so much of the C. P. Blue as will do over the job in hand, and thin it with turpentine only; make quite thin and apply freely one coat. The color thus mixed will work under the brush with great freedom and dry perfectly dead-flat. It is urged that no binder or varnish, oil, or dryer of any kind be added to these blues; they are designed to be used as above directed and over the special groundwork made for them, which is entirely free from Prussian and Chinese Blues and will not destroy the beautiful tone of the C. P. Blues. When dry apply a coat of varnish-color made of one-quarter pound of C. P. Blue paste and one pound of rubbing-varnish; it is prudent to first thin the color with turpentine when making varnish-color, and then stir it into the rubbing-varnish. By this method of thinning and mixing, as every painter knows, his varnish-color will be perfectly smooth and consistent all the way through. Flow on to the flat surface of C. P. Blue the first coat of varnish-color and note the results of this coat. In a few minutes it will saturate the flat blue and bring out the color to the same richness of tone as it appears in the moist paste in the color-can; also, the groundwork is entirely obscured and there is no appearance of Prussian Blue to mar the beauty of the glaze. When this coat is dry,

rub carefully, using water freely and with not too much pumice-stone, then apply a second coat of varnish-color, using no clear-varnish until ready for the finishing-coat of wearing-body. There has always been more or less difficulty and uncertainty about blues, particularly the beautiful transparent blues, but these troubles are quite overcome by the above method of painting with our C. P. Blues and groundwork, and we believe they will prove a permanent satisfaction to the painter. While there is no element of blue in this groundwork, it is the one proper color over which to paint a deep transparent blue. Valentine's Superfine Ultramarine Blue, handled in the manner above indicated for the C. P. Blues, can be painted over this groundwork most successfully. The two important features of this groundwork are its affinity for the flat coat and its peculiarity of entirely disappearing beneath the glaze.

Don't cover an opened can of blue with water. A spoonful of turpentine will keep it moist a month if covered tightly.

ADVERTISING

The fact has been noted elsewhere that the average old-time carriage-painter is not a good business man measured by modern standards. His business policy and business code are those of the village blacksmith under the spreading chestnut-tree. In fact, he is a lincal descendant of the village blacksmith and very frequently runs his paintshop as an adjunct to the village smithy.

One thing the old-time carriage painter does not take to readily is advertising. One thing the modern automobile paint-shop must do is advertise. The motor-car owner expects to be advertised to; he gets into the habit of reading the motor-car advertising and acting on it; he buys his car as the result of advertising and he buys his accessories in the same way, either consciously or unconsciously; he will respond quite as readily, and perhaps more readily, to the automobile paint-shop which advertises because it is unusual for the paint-shop to advertise.

It has been figured out that there are something like two million cars in this country at the present time which should be painted or varnished. At an average price per job of \$50 this means one hundred million dollars' worth of painting work for somebody to do. If, as is possible, the average price per job should be reduced on account of the number of small cars, the sum in any event is stupendous.

This work is not being done at the present time. Only a small percentage of the cars which should be painted and varnished are now receiving proper care in this direction. It is distinctly a case of advertising, to create business in the first place, and in the second place to bring it to the man who advertises.

The automobile paint-shop has an important advantage in its publicity work. It has access—or can have—to a list of all the motor-car owners in its vicinity, an advantage possessed by almost no other line of business. This suggests that direct advertising to the motor-car owner is the most feasible and the surest to bring results. Booklets, folders, blotters, postal cards, letters, etc., if properly gotten up are sure to bring business.

Newspaper advertising is in many instances quite as important. Where the local paper is a good one and read by the community, newspaper advertising if properly done cannot fail to bring results.

The automobile paint-shop should, first of all, have a good, big sign informing the world that it paints

DAN R. BLACK SMITH

THE GOOD OLD NAME OF SMITH IS MADE TO DO DOUBLE DUTY IN DAN R'S CLEVER LETTERHEAD

motor-cars, so that even the man who runs an automobile may read. Next, the letterhead should distinctly state that automobile-painting is one of the features of the business.

The business-card should contain the same statement always.

Get your list of motor-car owners. Put up your sign. Begin your newspaper advertising. And then send out once or twice a month something in the way of a reminder to everyone on your list of car-owners—a blotter, a postal card, a booklet, a letter, a leaflet.

Is Your Money Safe?



"My money is safe, all right," exclaimed a brawny iron moulder, "Every week I give it to my wife and she hides it away where no thief will ever find it."

The rest of the men grinned and puffed their pipes. They were enjoying their noon hour rest outside a big foundry and after they had emptied their dinner pails the talk drifted to the question "Is your money safe?" It started from a newspaper headline, "Workman Robbed of All his Savings," on a scrap of paper wrapped about a sandwich.

"My money is safe, all right," repeated Mike the big moulder. "You bet my wife is pretty smart. She hides it where no robber will find it."

"Yes, but suppose your house burns down," broke in Husky Joe. Then you'd be in a fix. I know a fellow lost \$3000 that way. Now my money is safe, no matter what happens. I carry it right here," and he tapped his belt with his broad fingers. "I don't care who knows it. The fellow that can get it from me has got to fight for it."

"What if a hold-up hits you with a lead pipe from behind?" It was Silent Sam, who never spoke unless he had something to say. "You have less sense than Mike who hides it in his house. Your money's not safe!"

"I thought mine was safe enough," remarked the heavy fisted Russian, known as "Moscow." "My money went home every pay day. I was paying for a little farm in the old country, but I'd sell that farm today for ten dollars. The war burned up my money. Every dollar that I sweated for. Seven years work, and the Germans have got the farm!"

There was a pause, and then Silent Sam spoke again, and because he never spoke without thinking a long time over what he had to say, his friends listened, "Mates," he said, "My money is safe," it is in the hands of my best friend, and he is the strongest man in the world. What's more everybody knows he is square. Every-

body knows that he can pay his debts for he is the richest man in the world today, and he won't try to back out when the money is due. He's not that kind. Every week I lend him \$4.18 of my money. In 1923 he will pay me \$5.00. If I need it any time before then, I'll get it, and I'll get interest too.

"That sounds pretty good," said the moulder. "I guess I'll lend him some of mine, where does he live? Do you think he would take care of my wad?"

"He lives right around the corner," answered Silent Sam. "He will take care of your money just as he does of mine, in any amount from a quarter to a thousand dollars. If anybody takes it away from this old man, he'll have to be a better fighter than this world has seen yet."

Put the Boche Where He Belongs



FOOD WILL DO IT EAT LESS—SEND MORE ACROSS

"What does he do with the money you lend him?" inquired Moscow.

"Most of the money is spent to keep the Germans from crowding us off the earth," continued Silent Sam. "The money I lend him saves my home from being burned. It saves my wife and children from being run through with a bayonet. It keeps me from being a slave for Kaiser Bill, like those Belgian workingmen. It pays for food and clothing and cartridges for my oldest boy in France. My money is safe all right, and it's on the job every minute."

Silent Sam had not made such a long speech in years. His friends

looked at him in astonishment. Husky Joe began pulling at his waistband and painfully hauled out a stained money belt, like a fat shiny snake.

"I get you, Mate," he said, "My money goes to the same old party. His name is Uncle Sam. Show me where you buy Thrift Stamps."

"Me too," said Moscow, bringing up a handful of change from a leather pouch.

"Your bit is not done when you buy Thrift Stamps," replied Silent Sam. "It's up to you to be a real nephew of our Uncle Sam. Learn his language, and see that your wife and children learn it too. Mix with Americans. You live with us, and you'd better be one of us. Move out of that shanty by the railroad tracks and get a good house for your family. You can get better land here than you ever could in Russia. And this goes for all of you who have been born abroad; invest what you have in America, learn what American citizenship really means, and be an American."

FITTING CONNECTING ROD BEARINGS

It is sometimes possible to remove the crankshaft of the engine and when this is done, connecting rod bearings can be fitted with a minimum of trouble and much quicker and no doubt better than while lying on your back underneath an engine that persists in dropping oil in your eyes.

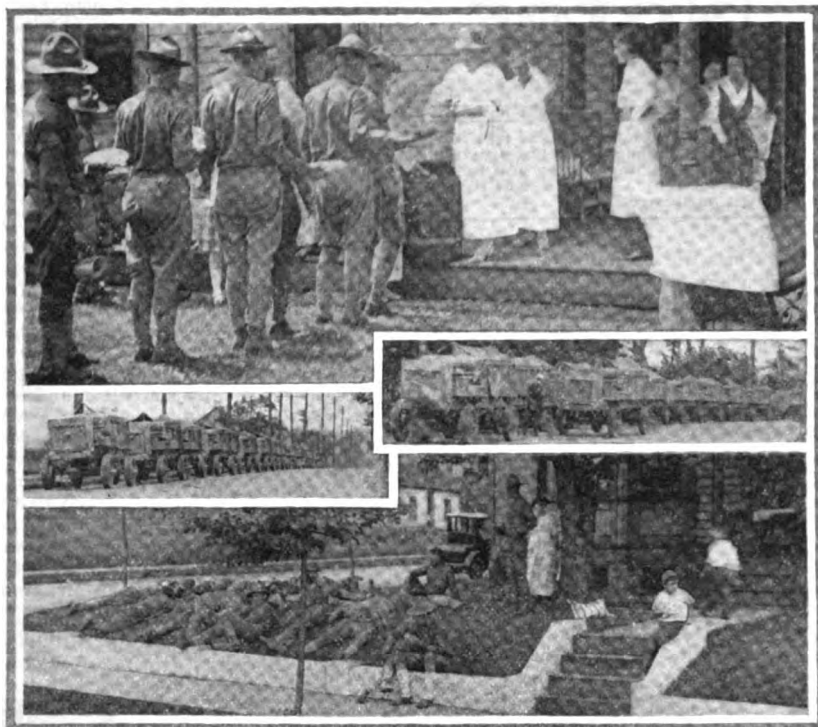
A board extending to the floor and bolted to the work bench and having a "V" notch cut in the top for holding the shaft permits the bearings to be fitted in double quick time. A similar board should be provided to support the free end of the shaft. The shaft being bolted cannot turn or slip off and if there is a clear space between the shaft and the floor the connecting rods can be turned entirely around and the bearings tested in any position.

EMERGENCY WELDING COMPOUND

Often times the shop will just naturally run out of welding compound and as a rule the local stores do not carry such an article.

I use a mixture composed of 2-3 red brick dust and 1-3 fine iron filings. With this compound one man can weld plow points, toe calks and even spring steel.

Government Drives Trucks Over Historic Highways to the Atlantic Coast



One of the oldest roads in the country is known as the National Pike, extending from Baltimore to St. Louis. This road was built by the government which gives the postoffice department authority to build post roads. The necessity of post roads has long since passed and this piece of road has been turned over to the states through which it passes.

Today hundreds of motor trucks are passing over this road bound for the Atlantic seaboard for shipment to France.

At the towns where the truck

trains stop on their long trips the residents give the boys a hearty welcome.

The trucks shown in the picture are ammunition trucks, the army supply trucks have covered tops of the old Prairie Schooner type. The soldiers accompanying this train are seen enjoying the open hospitality of Uniontown, Pa., residents.

One of the largest board automobile race tracks in the country is at Uniontown and some notable automobile speed records have been made on this mile and half track.

SAFETY HOOK.

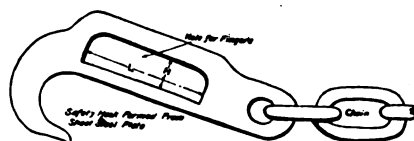
When hooks of the ordinary design are used on the end of a chain or line for pulling things around by power, accidents occur frequently.

Sometimes the man whose job is to attach the hook takes a chance and tries to hook it on the fly and gets a crushed hand or mashed fingers as a result even if it is not necessary to amputate the hand or fingers.

With a hook made as shown in the illustration such accidents are largely prevented. This "Safety First" hook has a finger hole whereby it may be held and pro-

teets the fingers in such a way that they are not likely to be caught and mutilated.

Naturally the proportions of such



HOOK WHICH WILL PREVENT CRUSHING THE FINGERS

a hook will vary with the work it is to be used for—the heavier the work the heavier the hook, of course. In any case the length of the finger opening at L should be sufficiently long, about four inches,

so that the fingers may be readily inserted in it. Correspondingly the height at H should be at least an inch and a half. Where the work required is not too heavy satisfactory hooks of this kind can be cut or forged from sheet steel plate. —American Engineer.

WAR TIME TRAFFIC IN ENGLAND

JOHN Y. DUNLOP.

From a brief visit to several towns in England and Scotland it is evident that the petrol (gasoline) restrictions and other difficulties have completely stopped ordinary motoring traffic.

In London one still sees enough cars to remind one of their existence but in the large cities of Glasgow, Edinburg and in the south, traffic conditions are almost those of twenty years ago.

The horse vehicles have come into their own again and the ancient brougham is everywhere enjoying a new period of popularity.

A few years ago the most of the old established coach builders had large stocks of horse drawn carriages left by their customers for sale in the days in which the automobile appeared as a successful possibility on the horizon.

Difficult and often impossible to sell, these vehicles seemed to represent a dead loss but the impossibility of using automobiles under present conditions has resulted in many of these old horse drawn vehicles being done over and brought into use again and they now form quite a feature of town and countryside war-time traffic.

This condition also means a part time revival of the one time busy forge shop along the old lines but it can only be for quite a short period for with the end of the war and the release of motor spirits and gas for commercial and farmers' purposes we will have the return of the automobile in a much stronger sense than it has ever been.

Plans are already under discussion in England for the manufacture of standardized automobiles and quantity production following the best American practice by some of the large factories that have been brought into being as a result of the war demand for munitions.

The first public garage of record, where motor cars could be stored, repaired or rented, was opened in Boston, Mass., early in the spring of 1899.

Queries-Answers-Notes



THIS department is the meeting place where you are free to ask for information, answer questions, discuss shop matters and business conditions and any other notes you feel would be of interest to a fellow mechanic. Make use of this Department as often as desired.

It Can't be Done—How do you tighten the gears or make them mesh deeper in the Ford differential? The cogs that are slipping are the drive pinion on the end of the drive shaft and the cog fastened to the differential on the rear axle.

C. S. Hough, New Jersey.

In reply,—No provision is made for tightening up the pinion and the large gear in the Ford differential. New ones are so cheap it is not worth while. However in an emergency, the large differential drive gear can be drawn closer to the pinion gear by placing a slightly larger washer between the two ends of the axle inside the differential housing. Just the slightest difference, however, is all that is necessary.

S. S., New York.

One hundred miles from Los Angeles in Big Bear lake district of the San Bernardino mountains is located Pine Knot Lodge which is presided over by S. O. (Dad) Skinner. Dad himself has a great personality and a wide acquaintance among many noted people. He might be termed the "Czar of Pine Lodge" for he is the postmaster justice of the peace, game warden, member of the fish and game commission and sells Overland and Willys-Knight cars besides knowing how to extend the glad hand of welcome to the thousands of visitors who find their way to this delightful place.

One of the first things that assails the eye as the summit is reached is the Overland service sign conspicuously placed to greet every newcomer. In one season over 58,000 cars registered at this station. "Dad" conducts one of the most complete repair shops in California and his place is undoubtedly one of the highest spots in California, 68,000 feet above sea level.

Glad he Carried out His Threat—I have been threatening to write for a long time so I guess this is a good time to break the ice.

Just now I am helping Uncle Sam build the kind of things that will make the Kaiser's subs sob with grief. I imagine I can see the tears rolling down his periscope now. I have been here two months and was beginning to feel that I had lost something. I guess you have an idea what it was Ed. (That isn't our name, only the abbreviation for editor.) I just got the last two numbers the other day and believe me it was like meeting an old friend. Well, I got out my camp chair, leaned up against the tent and got busy.

We have quite a tent city here—up to date too, with floors and boarded up walls, screens, gas electric lights, water, shower baths and sewage system in so you can see that while we are serving Uncle Sam that we are having the pleasures of camp life as well as lots of good fishing besides.

I don't see why so many blacksmiths

mourn the loss of the horseshoeing business when there is plenty of work with more of the long green attached to it, in place of the horse is the auto truck and tractor and in place of the wagon you have the trailer. Making truck bodies, commercial bodies and repairs and you still have farm implements as you had before so about the only thing the blacksmith will miss is the horse and some are going to miss the rest by not taking hold of the opportunity while it is hanging around their shop.

What gets my goat is why these brawny sons of Vulcan lay down and quit and leave these "geeks" that smoke cigarettes and part their hair in the middle walk away with the work the smithy should have. I don't know of any other class of

and it is all mechanical work and you can build trailers, truck and commercial bodies and keep up repairs on them. Also there are dents to be taken out of fenders and bodies which you can become expert at in a short time and if you can have a paint department, make new tops and as you go along you will become familiar with the engine and so forth. Certainly, study up your trade paper and I would recommend Dyke's Encyclopedia and when you get going I am sure you will find plenty of work and with larger profits; but don't run your auto repair business like you did your old shop, put it on a business basis. You know the old saying that "a good blacksmith can do a good job without tools." That is all right enough in its way but don't forget that it is tools and machinery that brings in the kale. Now, before you give up the old shop, sit down and think it over. Clean up, make the shop look a little brighter and it will help remove the cobwebs from your business. Now if you run up against a hard case write to the editor and somebody will open up and tell you a whole lot of good wrinkles he had on cold storage until you came along.

Well, Ed. I have run out of paper and I guess you will be glad. If you like this letter I will write again and if you don't I'll write anyway so you lose both ways.

Joseph Hughes, Virginia.

Here's hoping we hear from Mr. Hughes again and we would like to hear what others have to say along these lines.

"Ed."



THE DOMAIN OF THE "CZAR OF PINE KNOT LODGE"

mechanics that has a better chance of making success of auto repairing than the blacksmith and yet a lot of them lay down and let these "geeks" that learn how to run a car and hardly know the difference between the carburetor and the spark plug walk away with it. I want to tell you brothers that you have the advantage over most of these fly-by nighters that start in the auto business considering that you have the best trade paper in the world to back you up. Now, it is not necessary to know all about the engine, transmission, ignition etc., to start with. There is plenty of other work you can start on. You should have a welding outfit for welding frames, lamp brackets, lengthening truck frames and there are axles and wheel rims as well as springs,

Discharged From the Army—In a personal letter from Mr. Northwood whose interesting articles on his convoy experiences in France are appearing in this magazine, he states that since recovering from his wounds he has received his honorable discharge from the British army and is back home again with his family. He states that he is not feeling any too well yet but that he is depending on his wife's cooking to put him on his feet again.

In this letter he states that he hopes to reopen his shop as soon as he is in a little better shape but that he fears that he will have to cut out horseshoeing for some considerable time. The help problem in Britain is even worse than it is here where almost every able bodied man, married or

unmarried up to 45 years of age is receiving the King's shilling.

Mr. Northwood tells us that he believes the new fighting material from America is going to muzzle the kaiser and settle the war.

The Splay Foot and its Troubles—Having read a lot of good stuff on shoeing but not much on toeing out I thought I would write a little on the subject myself.

The toe-out horse as every shoer knows, if not shod right will cut his ankles, shins or knees and the horse that toes out breaks over the outside toe. The first thing to do is to get the feet level and the only way to do this with is with a foot adjuster. After the feet have been properly dressed make a 10 ounce shoe, beveled on the outside toe from the toe center to heel nail. In doing this you permit the foot in leaving the ground to be carried outward and also shortening the ground tread. The foot in rolling outward will clear the opposite leg.

The accompanying illustration of the shoes I use in Nos. 1 and 2 have a wide web on the inside. It prevents the foot from sinking in the ground. A calk on the inside toe prevents leg-leaning. Am much interested in Mr. Camp's writing on shoeing. He writes things that if read and understood by the reader would be of great benefit to the shoer.

L. A. Stoddard, Nova Scotia.

Dead Axles have gone—Will you tell me what kind of axles are used on modern cars? A friend insists that dead axles are used on practically all American cars; I say not. Am I right?

Oswald Bissing, Texas.

In reply we will say that you are correct in your assumption. The type of axle known as a "dead axle" is used only on cars having chain drive, which is only on certain trucks, for there are no American passenger cars now using this construction. The dead axle does not turn but simply carries weight in just the same way that the axle of a farm wagon does.

J. S. H.

Fitting Bearings on Shaft—In fitting bearings on a shaft on the bench, do they set them up tight and then figure on a work in period to loosen them or do they set them loose? What is the best practice? How about piston rings in their grooves?

E. K. Remick, Canada.

The better practice is to fit the bearings freely, so that the rod or shaft may be turned with a little effort on the part of the workman. The bearing should fit it all around and not touching on any one side. In other words, there must be a contact all around the shaft and still the bearing must be free enough, so that a little effort can push the rod around. Piston rings should be fitted tightly without play, but still so that the ring can move.

S. S.

Let's Hear Your Views—Have just received my first copy of your magazine and in speaking a word of praise for it cannot commend it too highly.

Among the many commendable features, the one which appeals to me most is the Service Department. We are in particular need of that department at the present time and I feel sure that you are in a position to do us some good.

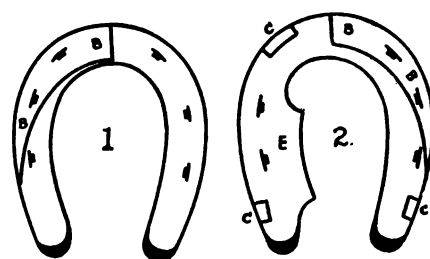
No doubt you as well as others in the auto repair business know how hard it is to keep "tab" on the time spent on a particular job when one is being called

away every little bit to make some minor adjustment on some other job.

What we are after is some sort of form provided with spaces where one may fill in the time he starts and is called away from that particular job even though he is called away a half dozen times in as many hours. To be the most efficient this form should be made in the shape of a tag which may be fashioned to the job itself. It should also be made in duplicate so that one part may be preserved as an office record and the other given to the customer as an itemized account of the time and material used on that particular work.

Leesburg Auto Co., L. Holmes, Proprietor.

Another Friend With the Colors—"I am in the signal corps and expect in about six weeks to be on my way overseas. We have been in training here two weeks and have yet six weeks to finish our course here. We have all work and not a great deal of play in this camp life. It is something that I did not care a great deal about getting into at first but since I have put in two weeks I have changed my



NO. 1—BB THE BEVEL FROM TOE CENTER TO HEEL NAIL
NO. 2—BB, BEVEL; C, 3/16 CALK; W, THE SIDE WEB

mind about the service a heap. This is a very important branch of the service and if I can make good I will do all I can to lick Kaiser Bill and his unholy crew.

"You might not hear from me very often but I hope to see your offices on the return trip from France."

Ralph Keeney.

Just like His Favorite Hammer—I haven't been writing much but will try and tell you what I am doing. I am in a general repair shop and do all kinds of work and am forced to do auto work as well. Most of the cars in these parts are Fords and I sure do like the work. Shop supplies are so high that some of my customers won't have their farm tools repaired only as they are compelled to, that makes the work hard on me. I can't get a hand to help me as they have all enlisted or been drafted. I would like to see the prices other smiths are getting for their work.

I think our journal is the grandest paper on earth and it is just as useful to me as my favorite hammer. I have raised my prices on everything I do. I would like to see more on brazing. I haven't any other way of heating but the forge. I get good prices and am doing a good business. I am in the draft and expect to be called out when they get down to Class III.

W. C. LeBow, Missouri.

Tricks of the Trade—The sealer of weights and measures for the City of Chicago and his deputies have been investigating the gasoline measuring pumps in that city and he claims that more than a million dollars is lost yearly by motor-

ists in gasoline for which they pay without receiving. Defective pumps in garages and supply stations and tricks in the pumping known to the wily garage men are responsible for this loss according to the inspectors.

Investigations covering two weeks show that two thirds of the public gasoline pumps give from one ounce short to two quarts in some instances, based on a five gallon measurement.

Experiments made by the inspectors prove that in practically every case the rapid manipulation of the pump means short measure.

"In some cases the pump is defective," says the city sealer, "but oftentimes the garageman, with an eye to his profit, manipulates the pump to give short measure."

"A quick jerk of the pump and a rapid turn of the handle will always force some of the gasoline back into the container. A slow, steady turn, if the pump is not out of order, will give the full amount. But it is not always the garage man's fault. The automobilist often is in a hurry, and by his own haste causes the loss to himself."

Success at Repairing Storage Batteries In Australia—Just received the April number of the Auto and Tractor Shop and think it a fine number, touching on a little of everything handy to the craft of today. I also received Overland instruction book you sent me and also the book on Storage Batteries Simplified. It is the best that could be obtained for my job. We are in a small country town and we have had a garage in connection with our shop for the last three years and the work in this line has increased to such an extent that we find ourselves unable to care for all that is brought to us. I have been blacksmithing until six months ago and since that time have done nothing but battery repairing and I think all in our country towns out here are getting in touch with this same business and I think it would be very useful to touch a little more on batteries in your journal as I feel sure it will help a good number to take up battery repairing. You would probably be surprised if I told you of the batteries they send to us from neighboring towns. I recently suggested to a friend of mine in another town "why don't you have a go at them and install a dynamo"? He could easily afford it but he said he didn't like the looks of the "beggars", that they looked like a ticklish job to him.

I myself made today a battery apron like the one described in the April number and it is a fine idea. I have not done any plate burning in yet. I believe there are a lot of kinks to be learned about them and I would like to learn them. I would like to hear through your Queries Answers and Notes department how to repair broken hard rubber battery jars as there are so many different sizes of batteries and jars that cannot be obtained from the dealers in convenient time and the battery is practically no good with a cracked jar. If some reader could give us a substantial remedy for repairing them it would be very useful to all readers. In future I think I will make more use of this department.

Automobiles are coming into Australia in increasingly large numbers and are becoming a more important factor of the Commonwealth's life every day and are becoming more interested in this work. Go where you will in country towns, you will find blacksmiths dodging all the shoeing they can to work on an automobile.

I. X. L. South Australia.



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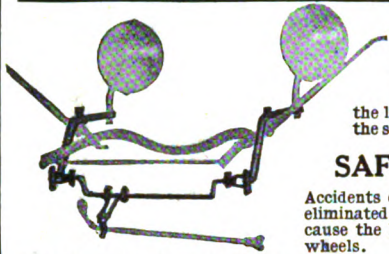
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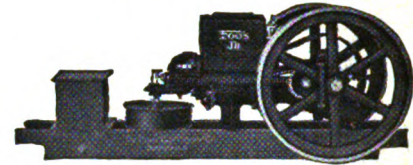
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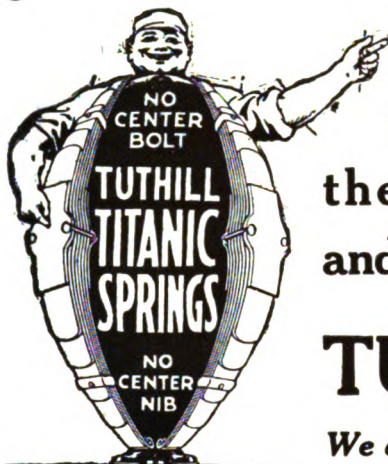
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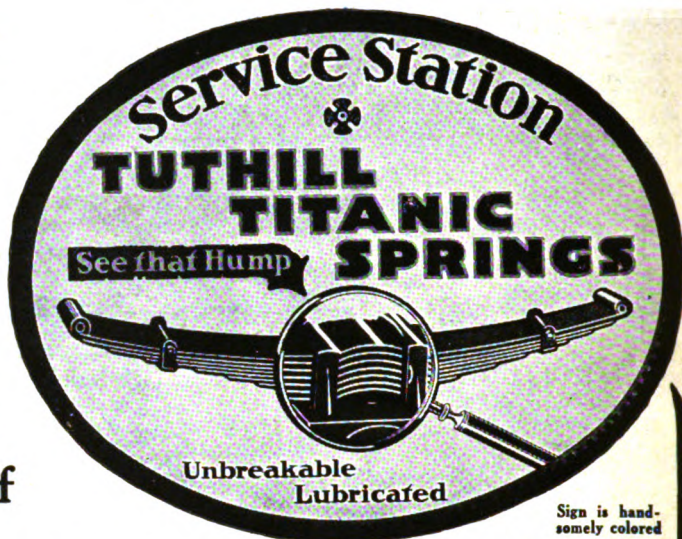
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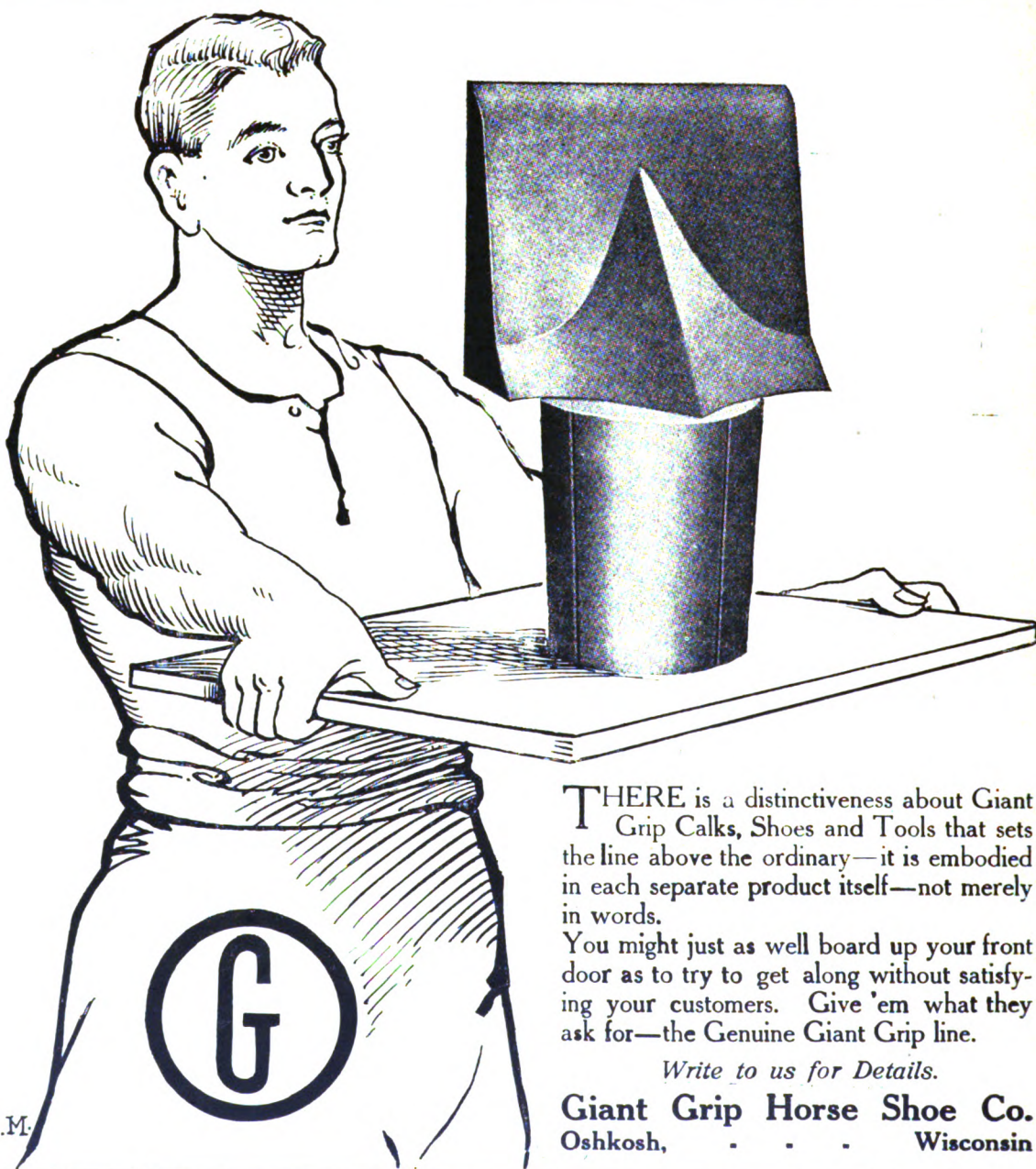


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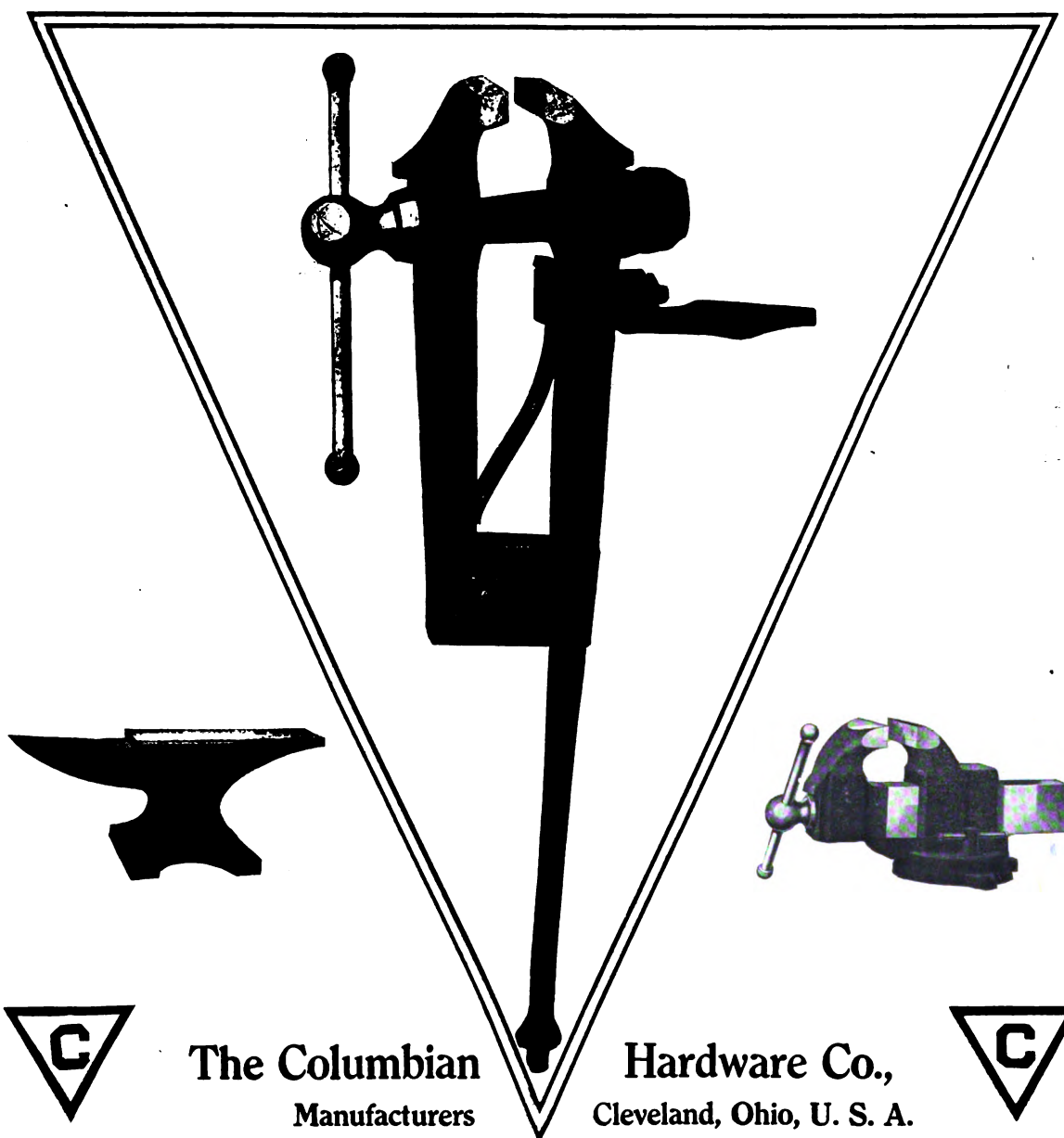
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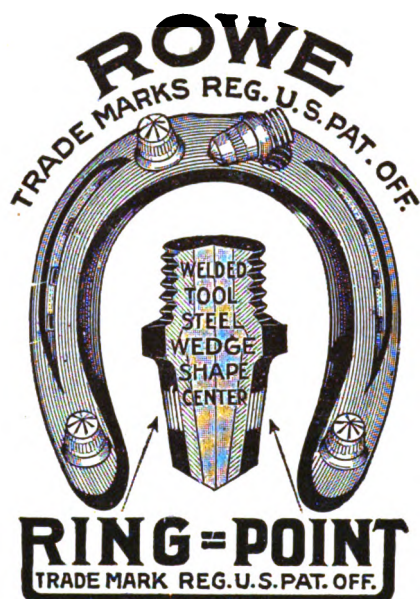


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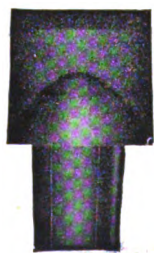
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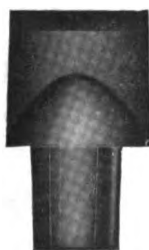
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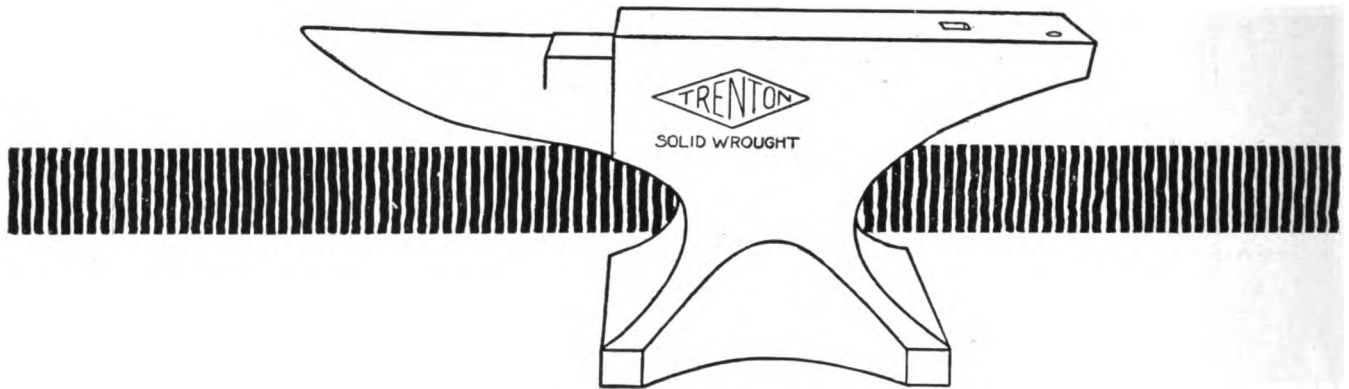
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Blacksmiths and Repairmen: There is a Splendid Profit For You in Prest-O-Grip Anti-Skid Chains. Write us For Descriptive Booklet—NOW!

We don't need to point out to you the enormously growing use of motor trucks. You see it on every hand. Motor trucks are rapidly coming to be a big factor in hauling and even in long-distance transportation.

You can make money by frankly recognizing this condition. Because it is just as certain as anything can be that as a horse needs calks for bad going, a motor truck must have chains on the tires for safe driving. And there is also just as much reason why YOU should sell safety tire chains to a truck owner as calks to a horse owner. You are surely entitled to the business, and you can get it if you will make a bid for it and sell the ONE make of chain that is the PROVED LEADER and the only one that will give ABSOLUTE SATISFACTION to your customers.



Prest-O-Grip Anti-Skid Chains

Why Prest-o-Grips? BECAUSE THEY ARE NOT NEW, UNTRIED OR EXPERIMENTAL. Their value has been proved through four years of successful use. When you sell a set to a truck owner he will get efficient service. He will come back to you for additional sets for his other trucks—not with complaints.

Just examine a set of Prest-O-Grips for yourself. As a practical man, you will quickly see the simple manner in which the chains are attached to and detached from the clamps on the spokes by means of two drop-forged patented Prest-O-Grip lock links.

You will also note that when these attachments are made the chains are securely locked on the wheel and cannot accidentally fall off as chains will when used in connection with any open hook manufactured or used as a home-made device.

You will also note the simplicity and strength of the rubber-lined malleable iron clamp that is permanently attached to the spoke.

Prest-O-Grips have the safe, sure traction that will guide the truck over an icy road or pull it out of a bad mud hole.

Write for descriptive Prest-O-Grip booklet and get the full story. Prest-O-Grips are sold through accessory jobbers and blacksmiths' supply houses.

Prest-O-Grip Anti-skid Chains will be sold to horseshoers on the same basis and with the same discounts given retail stores. Rowe Calks, as always in the past, are being sold only to horseshoers. We stand, and always have stood, for protection of our horseshoers. Methods of selling in the automobile accessory field differ materially from the methods employed in the adjustable calk field and require us to sell to both horseshoers and retail stores on the same basis.

THE ROWE COMPANY
Plantville, Conn.

Auto Repair Equipment

THE repairing of automobiles calls for accurate workmanship and this means *good tools*.

The old saying "The good workman does not complain about his tools" was alright in its day—but today the best workman is helpless unless he has the best of tools.

Automobile parts are made of good materials—hard steel parts and the tools must stand up under hard continuous service.

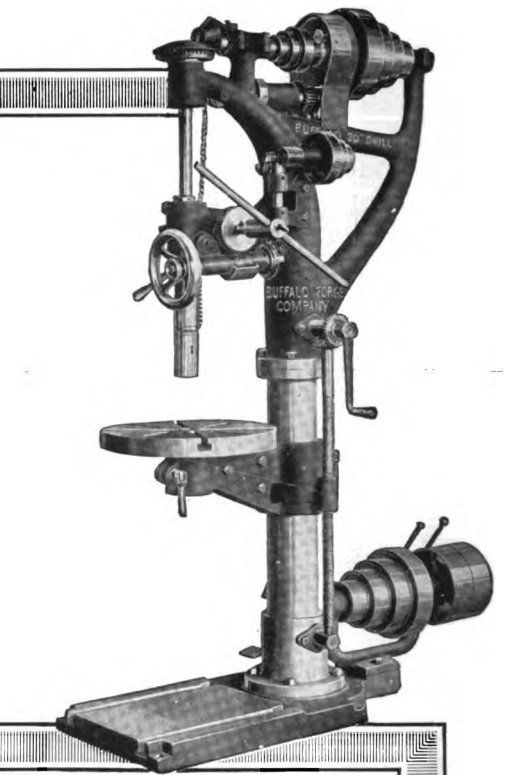
Buffalo

Vertical Drills are standard machine shop tools—they are being used in hundreds of shops because of their reasonable first cost and upkeep.

Why not get more information about Buffalo Garage Forges and Drills?

Write Dept. 1

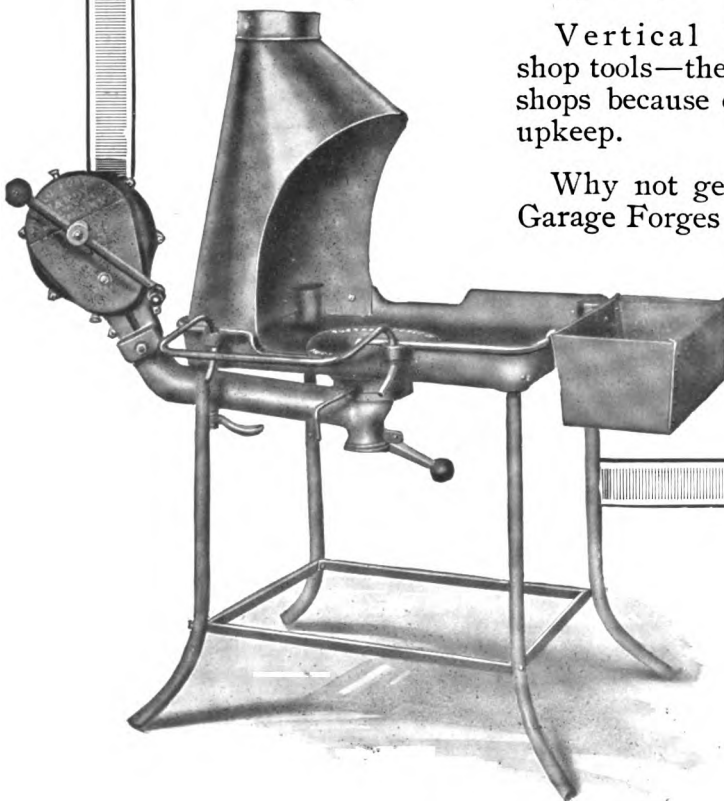
Buffalo Forge Co.
Buffalo, N. Y.



The Buffalo No. 5, 20" drill can be changed instantly from plain drive to back geared drive. Has eight speeds, three power feeds together with hand and lever feed.

Has cut gears; automatic feed stop; worm feed wheel, running in oil; table and base slotted.

Highly finished and accurately fitted.



The 540 Forge has cast iron hearth 23" x 30" securely mounted on rigidly braced pipe legs. Has round tuyere fitted with balanced ash-gate and clinker breaking valve.

Blower is ball bearing and has 10" fan. Produces uniform blast when turned either forward or backward. Can be converted instantly from right to left hand drive.

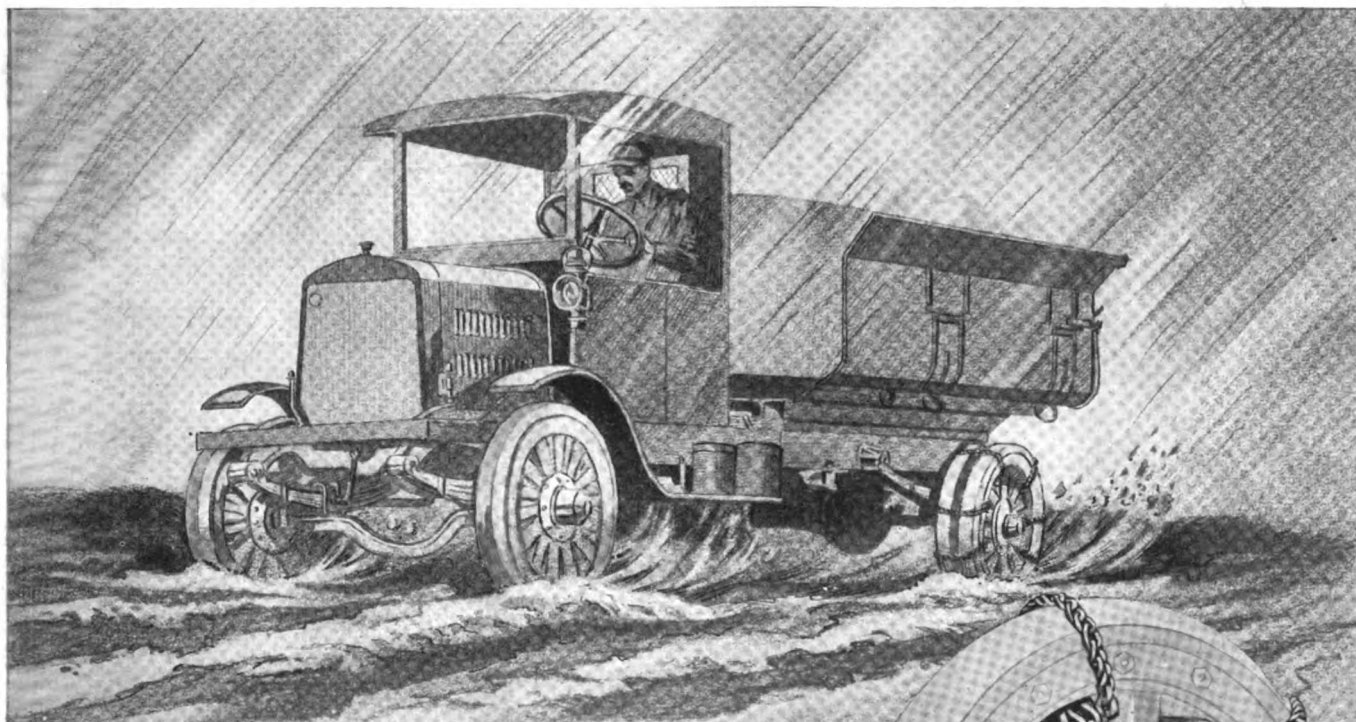
Can be furnished with windshield, (540); half-hood, (540H) and fullhood, (540F).

AMERICAN BLACKSMITH AUTO & TRACTOR SHOP

BUFFALO
N. Y., U. S. A.

APRIL, 1918

\$1.00 A YEAR
10c. A COPY



**The ONE Anti-Skid Device that
Successfully Battles with Mud, Deep
Ruts, Treacherous Roads and Icy,
Slippery Pavements!**

Tell Motor Truck Owners to buy

Prest-O-Grip
Anti-Skid Chains for Solid Tires

NOW and let it help them successfully battle with Spring Mud! Then they will have it for next winter's ice and snow—as well as the rainy, slippery, boggy going that will come in between.

Prest-O-Grip's distinctive feature is the two drop-forged patented lock-links. These **securely lock** the chains on the wheel; they cannot accidentally fall off—as chains will when used in connection with any open

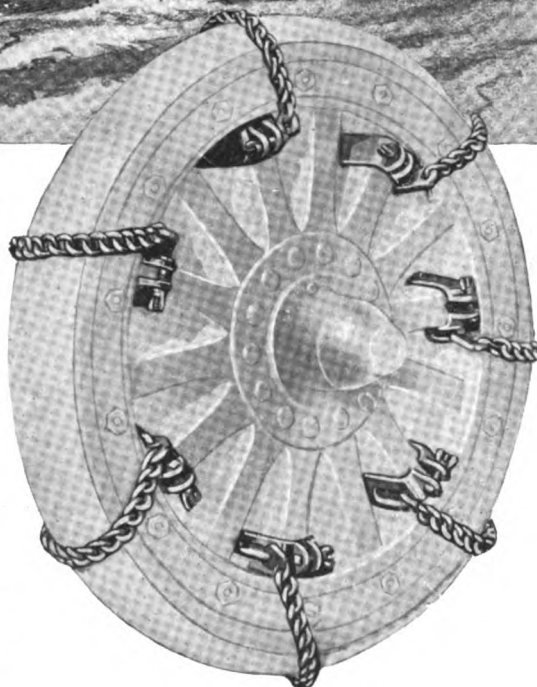
hook manufactured or used as a home-made device. The chains are quickly attached to and detached from the rubber-lined clamps permanently attached to the spokes. Presto (quick) grip—that's the idea!

Write for descriptive Prest-O-Grip Booklet and get the full story.

Prest-O-Grips are sold through accessory jobbers and blacksmiths' supply houses.

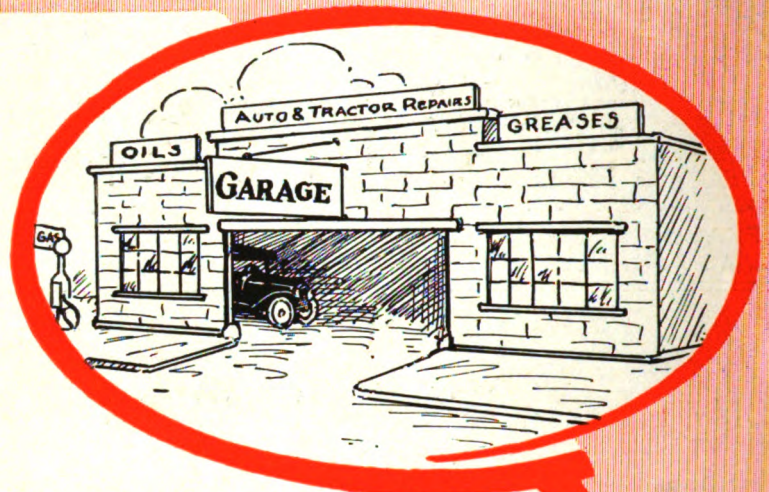
The Rowe Company
Plantville, Conn.

Prest-O-Grip Anti-skid Chains will be sold to horse-shoers on the same basis and with the same discounts given retail stores.
Rowe Calks, as always in the past, are being sold only to horse-shoers. We stand, and always have stood, for protection of our horse-shoers. Methods of selling in the automobile accessory field differ materially from the methods employed in the calk field and require us to sell to both horse-shoers and retail stores on the same basis.



EKERN'S

Money-saving
Devices for the
Garage, Auto and
Tractor Repair Shop



Garage equipment that you absolutely need if you want an up-to-date, money-making establishment.

Live garagemen and repairmen everywhere demand these PARO money saving devices because they *know* they are reliable, economical, thoroughly practical and an *absolute necessity*. *Insist on getting them from your jobber.*

Egern's Portable Grease Gun—

Keeps your grease off the floor and prevents waste. Registers the exact amount of grease sold to a customer—save their cost in a very short time. Handy—portable—can be moved to any part of the shop. Refilled in a minute. Holds 20 pounds of grease or 2½ gallons of oil.

List Prices; Model A, \$45.00
Model B, \$47.50

Egern's Emergency Axles for Ford Cars—

A big seller. With it a car can be placed on its own wheels in a jiffy. A life saver to the tourist with a broken axle. Made in three types.

List Prices: No. 1, \$5; No. 2, \$10;
No. 3, \$6

Egern's Portable Work Bench—

The handiest thing in the shop. On a roller base so it can be quickly and easily moved to any part of the shop. Has a clamp release to insure stability. Equipped with a machinest's vice, two large trays and a motor stand.

List Price: \$40.00, complete

Egern's Motor Stand and Axle Attachment—

Enables you to hold the engine in any desired position and may be easily moved about the shop. Equipped with a tool tray. The axle attachment is used to hold any kind of axle.

List Prices: Motor Stand, \$20.00,
Axle Attachment, \$6.00

We have many other practical shop devices and would be pleased to have you write to us for full details. If your jobber does not handle them, order direct.

Dealers and Jobbers

This line is the biggest seller in the market and is being widely advertised. Write for special attractive discounts, today.

1410-1412-1414
Michigan Blvd.,
Chicago, Ill.

H.G. Paro

"Buy a Smileage Book
for an Orphan in
the Army"

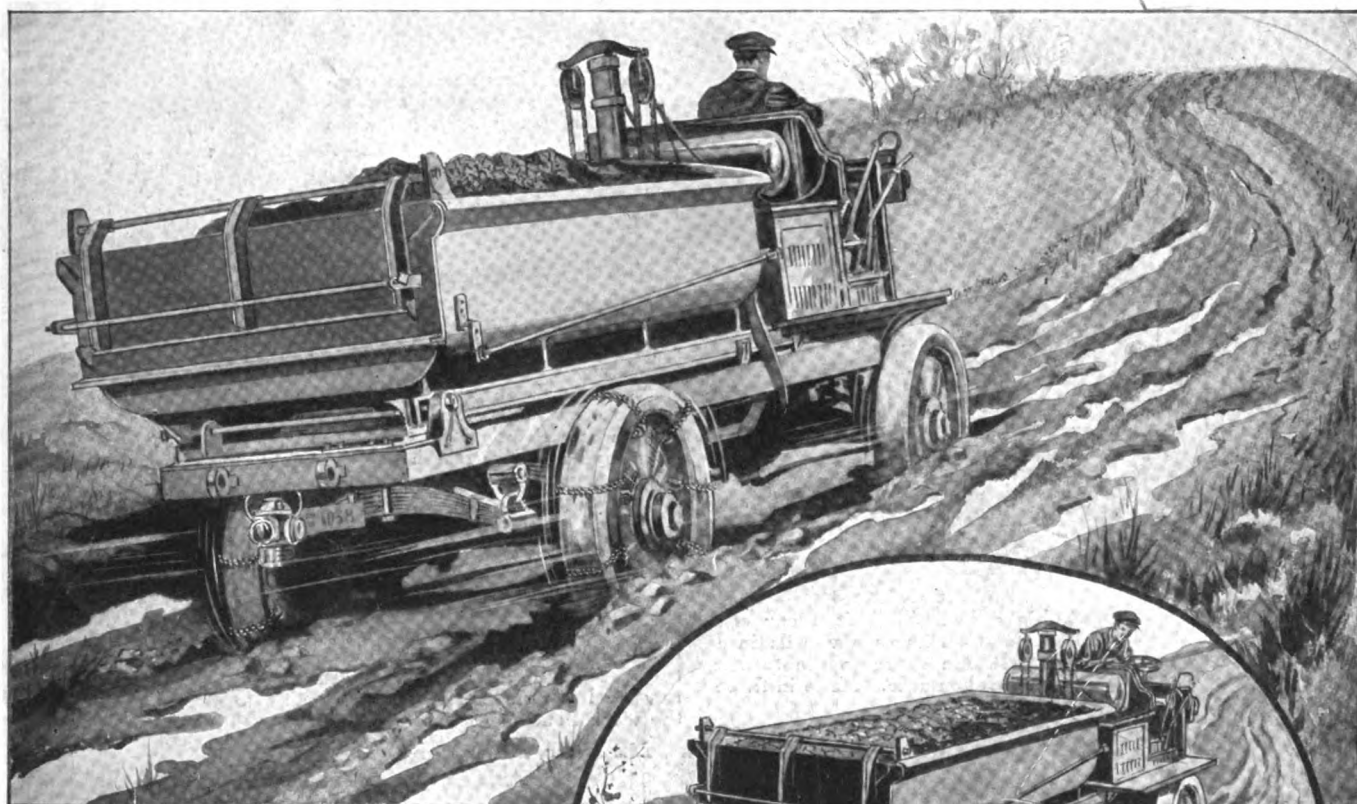
AMERICAN BLACKSMITH AUTO & TRACTOR SHOP

BUFFALO
N.Y., U.S.A.

MAY, 1918

\$1.00 A YEAR
10c. A COPY

Prest-O-Grip Helps The Heaviest Motor Truck Plow Through The Deepest Mud!



A familiar sight: A heavily-loaded motor truck with the big, smooth tires vainly spinning 'round in deep mud, the motor going like a battery of rapid fire guns and nobody getting anywhere!

To get there through the deep mud, snow and ice, equip your trucks with

Prest-O-Grip
Anti-Skid Chains for Solid Tires

Prest-O-Grip gives the *sure traction* necessary to drive the truck through the muddiest, ruttiest and most difficult roads.

Prest-O-Grip "stays put" on the tires. It positively *can't come off*—the two Prest-O-Grip lock-links hold it securely on the tires. And it is these two patented lock-links that make Prest-O-Grip so far superior to any other anti-skid device. There is no open hook arrangement to permit the chains to fall off.

Prest-O-Grip is quickly put on and taken off. No jacking up, no pushing the car around. Wherever the truck happens to be standing,

simply attach the chains to and detach them from the rubber-lined clamps permanently attached to the spokes.

Don't think that all anti-skid chains are alike. There is a vast difference. Compare Prest-O-Grips with any others and you will immediately see why.

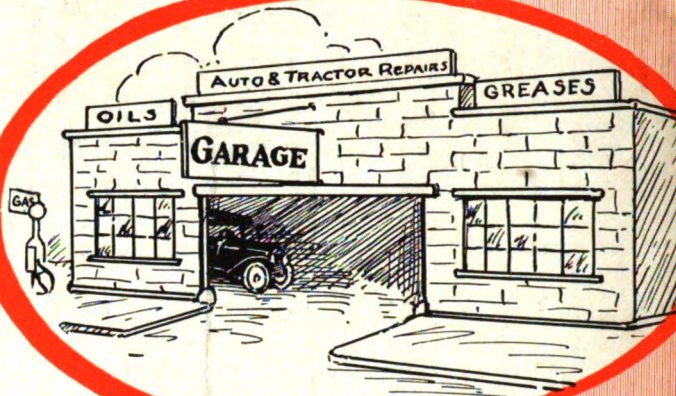
Prest-O-Grips are made in all sizes of clamps and all lengths of chain to fit every model of truck.

Shall we send you the Prest-O-Grip booklet giving the full story? Dealers supplied through established accessory jobbers.

THE ROWE CALK & CHAIN COMPANY, - - Plantsville, Conn.

Paro's

Money-saving Devices for the Garage, Auto and Tractor Repair Shop



Garage equipment that you absolutely need if you want an up-to-date, money-making establishment. Live garagemen and repairmen everywhere demand these PARO money saving devices because they know they are reliable, economical, thoroughly practical and an absolute necessity. Insist on getting them.

Your Jobber will supply you.

Ekern's Portable Grease Gun—

Keeps your grease off the floor and prevents waste. Registers the exact amount of grease sold to a customer—save their cost in a very short time. Handy—portable—can be moved to any part of the shop. Refilled in a minute. Holds 20 pounds of grease or 2½ gallons of oil.

List Price, Model K, \$47.50

Ekern's Emergency Axles for Ford Cars—

A big seller. With it a car can be placed on its own wheels in a jiffy. A life saver to the tourist with a broken axle. Made in three types.

List Prices, No. 1 For Fords \$5.00
No. 3 " " 6.00
No. 2 " any car 10.00

Ekern's Portable Work Bench—

The handiest thing in the shop. On a roller base so it can be quickly and easily moved to any part of the shop. Has a clamp release to insure stability. Equipped with a machinist's vise, two large trays and a motor stand.

List Price, \$40.00, complete

Ekern's Motor Stand and Axle Attachment—

Enables you to hold the engine in any desired position and may be easily moved about the shop. Equipped with a tool tray. The axle attachment is used to hold any kind of axle and is also applicable to the work bench.

List Prices, Motor Stand, \$20.00
Axle Attachment 6.00

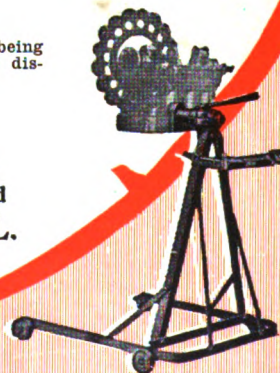
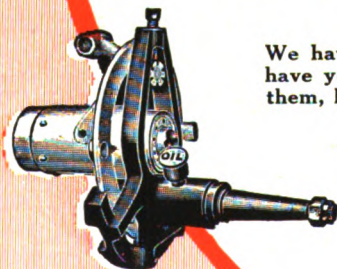
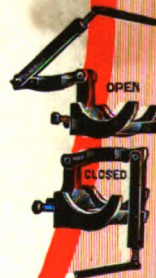
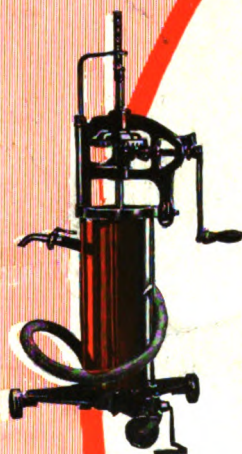
We have many other practical shop devices and would be pleased to, have you write to us for full details.. If your jobber does not handle them, let us know and we will advise you who does.

DEALERS AND JOBBERS

This line is the biggest seller in the market and is being widely advertised. Write for special attractive discounts, today.

McParo

Dept. O
1410-1412-1414
Michigan Boulevard
CHICAGO, ILL.



AMERICAN BLACKSMITH AUTO & TRACTOR SHOP

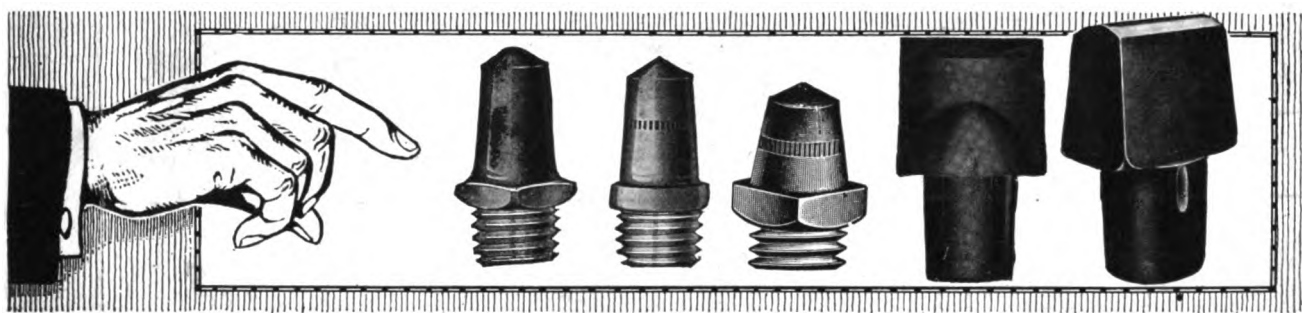
VOLUME 17
NUMBER 9

BUFFALO, N. Y., JUNE, 1918

\$1.00 A YEAR
10c. A COPY

Horseshoers! *Point this out to your customers:*

Rowe Calks Wear Longest and Sharpest



THE man who wants a job of sharp-shoeing done may not know the great difference in wear between Rowe Calks and others but if you tell him you are using

ROWE CALKS

and take a little trouble to show him just why these calks are superior, he quickly gets the impression that you are looking after his interests.

Rowe Ring Point Golden Rustless Screw Calks
will positively wear longer and sharper than any other make of screw calks, because there is just the right proportion of hard center to soft outside. There are no wire pins to fall out. Rowe Calks remain sharp as long as they remain in the shoe. And they cannot become loose in the shoe. Threads won't strip and they won't rust in the shoe.

Rowe Drive Calks
likewise wear longest and sharpest because they're manufactured from high-grade carbon steel made to our specifications. They are hardened and heat-treated in the most modern, scientific manner.

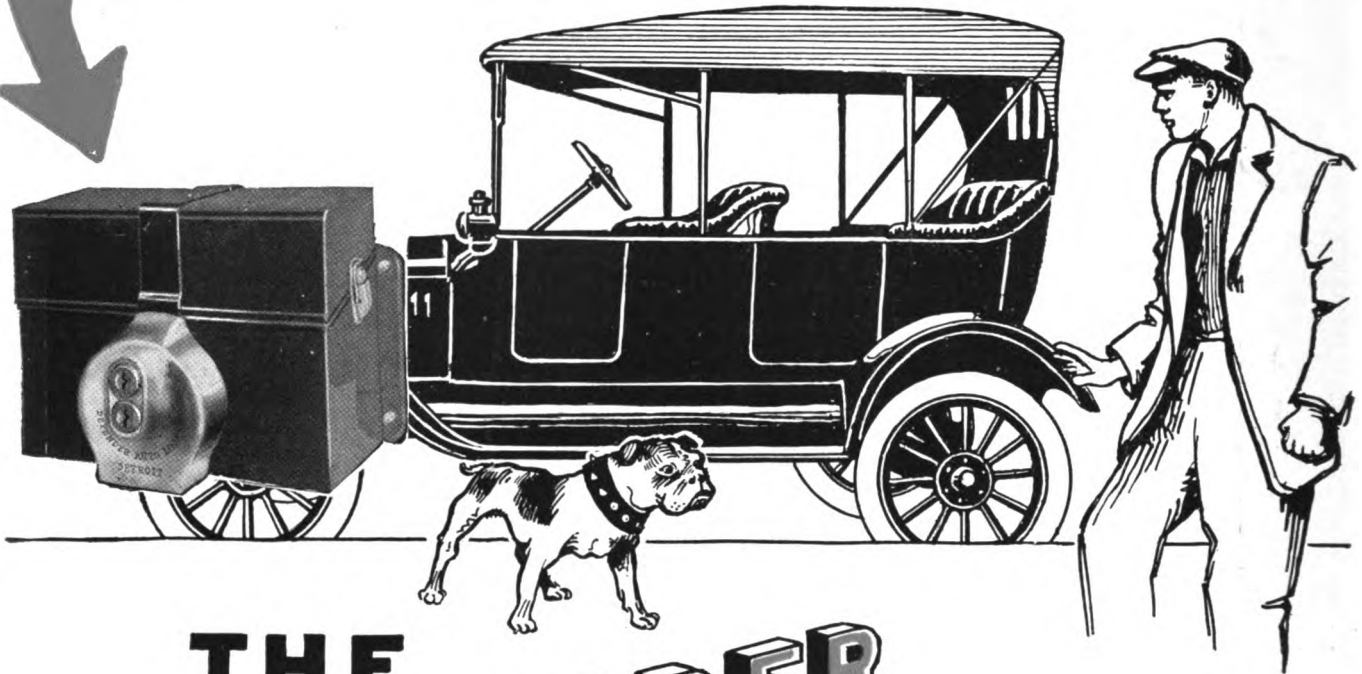
Rowe Calks are sold only under Rowe labels through Blacksmith's Supply Houses only. **We protect the Horseshoer.** Rowe Calks are not sold to retail stores, catalogue houses nor to consumers.

Ask for Horseshoers' Catalogue and Ad-Sheet showing free cuts for newspaper use.

The Rowe Calk & Chain Company
Plantsville, Conn.

If you repair motor trucks and supply accessories, look into PREST-O-GRIP ANTI-SKID CHAINS for solid tires. The one anti-skid device that successfully battles with Mud, Deep Ruts, Snow, Treacherous Roads and Icy, Slippery Pavements.

HE CAN'T GET AWAY
WITH IT *because for only* \$4⁰⁰



THE DEFENDER AUTO LOCK

STANDS BETWEEN

Ford cars, and all danger from "joy riders," petty thieves and sneak thieves, the three greatest "pests" in the whole country today.

THE FIVE BIG REASONS WHY DEFENDER LOCKS SELL

1. Locks and protects coil units with hardened steel band. (Patent pending.)
2. A beautiful, polished, solid aluminum casing; locks over switch. (Patent pending.)
3. Operates against the ignition by special grounding device. (Patent pending.)
4. Guaranteed for the entire life of car, and backed by a company fulfilling every sound business principle.
5. Recognized and used as a standard of perfection by insurance underwriters and saves 15% on insurance.

All Jobbers Handle the
DEFENDER

Write today for trade prices.

DEFENDER AUTO-LOCK CO.

510 Marquette Building
DETROIT, MICH.

Canadian General Elec. Co., Ltd., Toronto, Ont.

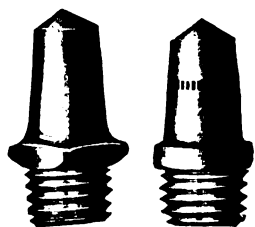
Sole Canadian Distributor

AMERICAN BLACKSMITH AUTO & TRACTOR SHOP

VOLUME 17
NUMBER 10

BUFFALO, N. Y., JULY, 1918

\$1.00 A YEAR
10c. A COPY



Rowe Ring Point "Golden" Rustless Calks

are just what their name implies—rustless. They will not rust in the shoe. They wear longer and sharper than other types of calks, because they're made with that very end in view. Just the right proportion of hard centre and soft outside—and no wire pins to drop out and cause trouble.

Rowe Drive Calks

are the toughest, hardest, longest-wearing drive calks that modern methods can produce from high-grade carbon steel treated in the most scientific manner.

Rowe Calks are sold under Rowe labels through Blacksmith's Supply Houses only. We protect the Horseshoer. Rowe Calks are not sold to retail stores, catalogue houses or to consumers.



**Every Auto Truck Owner is
your possible customer for**

Prest-O-Grip
Anti-Skid Chains for Solid Tires



Prest-O-Grips are *unit* cross chains, one chain to each alternate spoke, the chains being quickly attached to and detached from the rubber-lined clamps permanently attached to the spokes. The wear comes only on the cross chains.

Prest-O-Grip's distinctive feature is the two drop-forged patented lock-links which are guaranteed never to open accidentally and which securely lock the chains to the wheel. Prest-O-Grip Chains do not and cannot fall off—as chains will when used in connection with any open hook manufactured or as a home-made device.

Prest-O-Grips are sold through leading jobbers. Write for booklet.

The Rowe Calk & Chain Company
Plantsville, Conn.

Cooper

MARSHALLTOWN

Special CUT-OUT

"COVERS THE ROAD WITH A ROAR"



"COOPER SPECIAL"

A CUT OUT designed and built for the driver who **knows** a good cut out when he sees it. The Cooper "Special" is sold exclusively on its own merits.

- The slanted flapper and large exhaust opening prevent back pressure.
- The exhaust pipe is not cut in two to accommodate this cut out.
- The flapper is opened three inches by pushing the foot pedal down one-half inch.
- The lock on the foot pedal works instantly and never fails.

The Cooper "Special" cut out (for all makes of cars) is the only one for a car owner who is looking for a cut out that works simply, efficiently and never gives the least trouble.

Dealers—Get a stock from your jobber—cash in your share of profits from our extensive advertising.



Pedal

	No. 3 Pedal	"O" Pedal
1½ in. Outfits with.....	\$2.50	\$3.00
1¾ in. & 1¾ in. Outfits with.....	3.00	3.50
2 in. & 2½ in. Outfits with.....	3.50	4.00
2½ in. & 2½ in. Outfits with.....	4.00	4.50

Cooper Mfg. Company, Marshalltown, Iowa

Exclusive Sales Representative, THE FULTON COMPANY, MILWAUKEE, WIS.



Style O Pedal

I enclose \$.....for which please send me one copper special to fit my make of car.....

Size of exhaust pipe is.....I buy my accessories from.....

Signed.....

Address.....

AB July

P
11/27/1918

AMERICAN BLACKSMITH AUTO & TRACTOR SHOP

VOLUME 17
NUMBER 11

BUFFALO, N. Y., AUGUST, 1918

\$1.00 A YEAR
10c. A COPY

Entered as Second Class Matter at the Post Office at Buffalo, N. Y., under the Act of March 3, 1879

Horse Owners Are Rapidly Becoming Truck Owners

Many of Your Customers Who are having Horses Shod at your Shop have one or more Trucks—or soon will have. By handling Prest-O-Grips, You will retain such Customers as You are losing now by Reason of their Changing Over from Horses to Autos.

Prest-O-Grip *Anti-Skid Chains for Solid Tires*

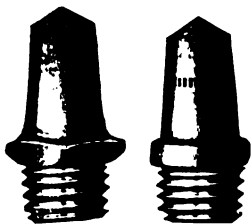
give protection from skidding in slippery weather, and they give the tractive power necessary to pull the heaviest truck through the muddiest ruts and the deepest snow.

The patented Prest-O-Grip Lock-Links identify Prest-O-Grip Anti-Skid Chains for solid tires. They securely lock the chains on the wheels. They afford absolute safety—the vital point of keeping the chains on the tires.

Prest-O-Grips are sold through leading jobbers. Write for booklet.



Hold Fast To Your Horseshoeing Trade by using Rowe Calks



There always will be plenty of horses to be sharp-shod—and Rowe Calks will help hold that business.

ROWE RING POINT "GOLDEN" RUSTLESS CALKS have these unchanging qualities, which are known to horse-shoers everywhere: They won't rust in the shoe. They wear longest and sharpest, because they have the right proportion

of hard center and soft outside. And there are no wire pins to loosen and drop out.

ROWE DRIVE CALKS are tough, hard, long-wearing. Our methods are modern and scientific.

Protection to the Horseshoer is our unvarying policy. We sell Rowe Calks through Blacksmiths' Supply Houses only—not to retail stores, catalog houses nor consumers.

The Rowe Calk & Chain Company
Plantsville, Conn.

PARO'S SHOP TOOLS

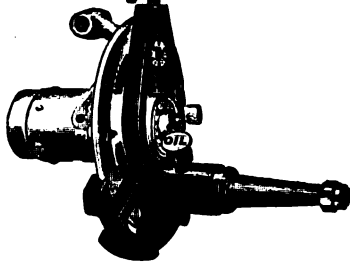


Emergency Axle No. 2

**Big, money-saving devices
that you NEED.**

**Absolutely indispensable to the up-to-date
garage and machine shop**

ORDER DIRECT FROM YOUR JOBBER.



Emergency Axle No. 1

Ekern Emergency Axles

For bringing in cars with broken axles. Can place a car on its own wheels in a few minutes. Nos. 1 & 3 for Fords; No. 2 for any make of car.

List Prices: No. 1, \$5; No. 3, \$6; No. 2, \$10.



Portable Work Bench

Ekern Portable Work Bench and Engine Stand

The handiest shop device you could buy. Enables you to hold engine in any desired position and move easily to any part of shop. Equipped with tool tray. Will handle any work on Ford motor or axle. List Price: \$40; weight, 120 lbs.

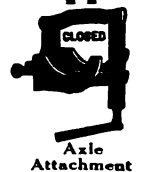
Axle Attachment

By merely bolting this to either our Portable Work Bench or Motor Stand, it quickly converts them into axle repairing stands.

List Price. \$6; Weight 9 lbs.



Axle Attachment



Axle Attachment

Ekern Portable Garage Grease Gun

Works like a gasoline filling station. Registers accurately the amount of grease put in gear case or differential. Works equally well on hard grease and liquid oil. When grease is used, it registers in pounds; when oil is used, it registers in pints. Something you simply cannot do without.

List Price: \$47.50; Weight 100 lbs.

Ekern Motor Stand

Indispensable for the repairman handling Ford repairs. Holds the motor in any desired position. Has a tool tray to hold tools and engine parts. On casters, so can be moved anywhere.

List Price: \$20.00, Weight, 50 pounds.

Many Other Practical Shop Devices

We have a wide variety of devices and equipment not mentioned here. Write for full details,—or ask your jobber.

Jobbers and Dealers

This is one of the biggest selling lines on the market and is being widely advertised. Write TODAY for discounts.



Motor Stand

Model K
Grease Gun

H.G. Paro Co.

1410-12-14 Michigan Blvd.

CHICAGO, ILL.

AMERICAN BLACKSMITH AUTO & TRACTOR SHOP

VOLUME 17
NUMBER 12

BUFFALO, N. Y., SEPTEMBER, 1918

\$1.00 A YEAR
10c. A COPY

Entered as Second Class Matter at the Post Office at Buffalo, N. Y., under the Act of March 3, 1879

Keep Up With the Changing Times—

Push Prest-O-Grip *Anti-Skid Chains for Solid Tires*

THE transformation from horses to motor trucks in many localities is more than startling; it is a warning to many horseshoers to get busy and push motor truck equipment.

Every Good, Live Horseshoer Can Sell

Prest-O-Grip

Anti-Skid Chains for Solid Tires

These are unit cross chains, one chain to each alternate spoke, the chains being quickly attached to and detached from the rubber-lined clamps permanently attached to the spokes.

*Be sure to get the new and interesting Prest-O-Grip Booklet.
Prest-O-Grips are sold through leading jobbers.*



Showing how easy it is, with the patented Prest-O-Grip Lock-Links, to snap Prest-O-Grip chains on and off. As will be seen, the chains lie flat on the tires—due to a special twist in the links. They do not cut the tires.

So long as Horses are used—and that will be a good many years to come—there will be a steady demand for

ROWE CALKS



Every horseshoer who has used Rowe Ring Point "Golden" Rustless Calks and Rowe Drive Calks will cheerfully testify to their long-wearing qualities and to our fair business methods.



Protection to the Horseshoer is our unvarying policy. We sell Rowe Calks through Blacksmiths' Supply Houses only—not to retail stores, catalog houses nor consumers.

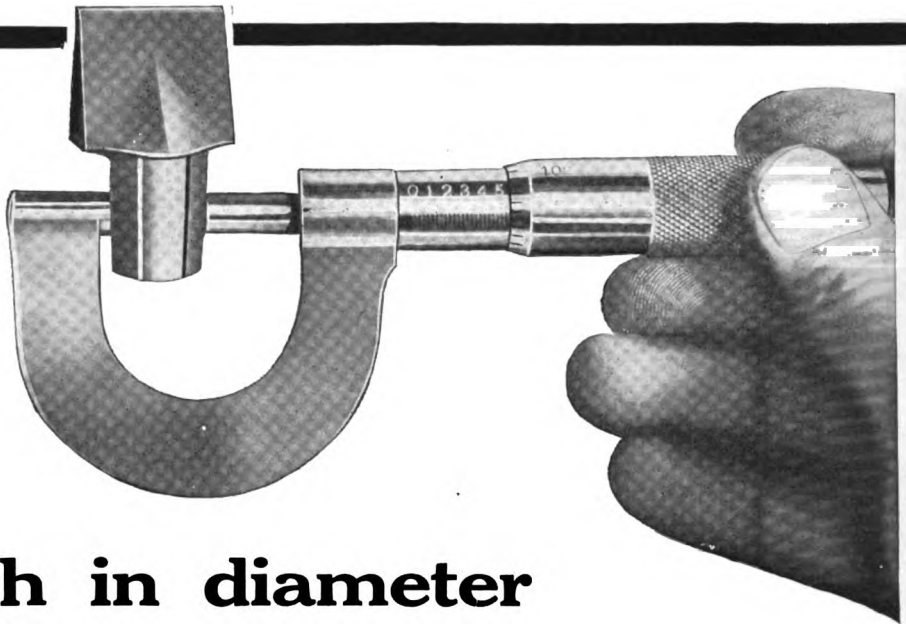


*The Rowe Calk & Chain Company
Plantsville, Conn.*

THEY DON'T VARY

1/10000th

of an inch in diameter



Short Blade



Standard Blade



Big Blade



Standard Blade



Short Blade



The calk-shank fits the calk-hole
ABSOLUTELY TIGHT.
that's why

DIAMOND CALKS

don't twist in the shoe or fall out.
They *stay in* so they *can wear out*.

Diamond shoes are every bit as good as the calks and, when used together, make the best footwear for horses that money and brains have yet produced.

Ask for Booklet.

Diamond Calk Horse Shoe Company
Duluth, Minn.

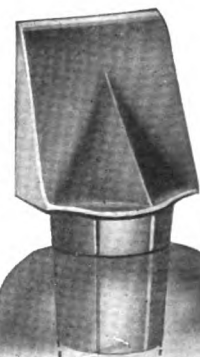


Made both
Long & Short Blade



Made both
Long & Short Blade

The accurate fit at every point, together with the small ridges on the shank are what prevents twisting or falling out.



Big Profits For You Making Motor Trucks

***Apply a Lakeside Truck Axle to Any Ford Car—Result:
A one, two or three ton Internal Gear Drive Motor Truck***

This is the greatest opportunity ever offered to shop owners—Every *farmer* needs one or *more* trucks and you can easily sell and attach Lakeside axles as soon as they are shown, because they make an efficient, powerful internal gear drive truck when applied to any Ford car, at a fraction of the cost of a new motor trucks—There is nothing to change on the passenger car.

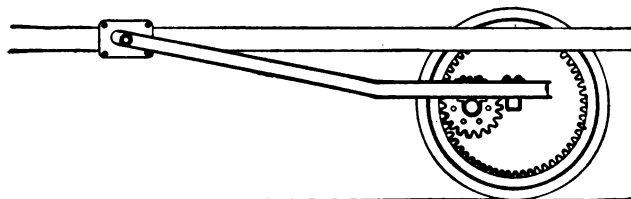
The LAKESIDE TRUCK AXLE

only axle in existence that can be

- (1) changed from extension truck attachment to trailer form.
- (2) changed from either of the above to another car; from the car on which you first install it.
- (3) Note particularly internal gear drive,—very much stronger and more substantial than worm drive, bevel gear drive or any other type.
- (4) There is no end thrust strain on bearings with internal gear drive, because the pull is made on the bearings and no leverage or torque strains like worm drives make from the center of your axle.
- (5) At any time desired size of axle and bearings may be changed and increase the tonnage of this axle up to four tons, with very little added expense.

Exclusive Agents Wanted

By ordering one Lakeside axle and sending deposit of \$50.00, paying the balance when it arrives, you will be given our exclusive agency in your section—Write us today before some one else in your locality takes advantage of this big money making opportunity or fill out and return coupon below. If you want more than one Lakeside axle at the present price tell us how many and we will reserve them for you to ship after you have seen the first one.



PRICE LIST TO AGENTS ONLY

Lakeside axles	\$275.00
Frame springs	50.00
Extension	25.00
Complete Unit	\$350.00
Discounts on orders for	
One	20%
Two	25%
Five	30%
Ten or over	33%

The Lakeside Truck Company is owned by responsible men who realize the importance of the Motor Truck on the Farm under present conditions. A passenger car equipped with a Lakeside Axle speeds up farm work and takes the place of two or three teams—With it the farmer can haul any loaded wagon over rough land and carry heavy loads at a speed up to 18 miles per hour.

Don't Delay. Get the Agency for This Line. Fill out and return the Coupon below Today.

LAKESIDE MOTOR TRUCK CO., 2210 - 12 - 14 S. Michigan Ave. **Chicago, Ill.**

LAKESIDE MOTOR TRUCK CO.,
2210 - 12 - 14 S. Michigan Avenue, Chicago, Ill.

Reserve for me the following territory as your exclusive agent.

Date.....

You may ship (1) Lakeside Axle and full equipment immediately for which I enclose deposit of \$50.00 and hold..... axles for future shipment providing the first one is satisfactory.

Name

Shipping Point.....

Address

Business



More Business Than Usual

Every automobile you work on will bring you more business if you have the "Gordon" Sample book and show your customers the desirability of "Gordon" Seat Covers and Top Recoverings.

"Gordon" Covers are quick sellers. They are easy to put on and they net you a good profit. The Sample Book and price list is all you need—no stock to carry—no measuring and no fitting. We make shipments in three days and have perfect fitting patterns for more than a thousand models of cars.

If people cannot get new cars, help them renew the upholstery on their old ones—help them get a Top Covering to make the old top as good as new.

"Gordon" Seat Covers, Top Recoverings, Tire Covers and other fabric equipment are in greater demand this season than ever before. You should get this business as a part of you overhauling and repair service.

Write for our proposition today

The J. P. Gordon Company,

325 North Fourth St.,

Columbus, Ohio

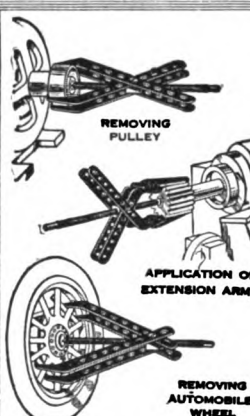


ALL-STEEL Weldless Anvils



Made from
Solid Crucible
Steel of
Special
Analysis

The Columbian Hardware Co.
Manufacturers, Cleveland, Ohio



"LITTLE GIANT" Gear and Wheel Puller

Does the work of two ordinary Pullers. Gets any gear, wheel, bearing or pulley—any place. Gets it quick—and gets it easy. Quickly adjustable up to 13 in. Can't twist off. Never lets go until you want it to. A "wizard" for work on hard-to-get-at jobs. Greatest time, trouble and money saver you ever laid hands on. Practically unbreakable. Absolutely bother-proof. Price \$10. Money back if not entirely satisfied. Descriptive matter on request. Order or write now.

Discounts To Dealers.

PREMIER ELECTRIC CO.
4052 Ravenswood Ave., Chicago, Ill.



**TWO BIG HELPS
IN WELDING**
DON'T BE WITHOUT THEM



"E-Z" Welding Compound

is the best BECAUSE it works equally good on all kinds of steel. It welds at lower heat than any other. It sticks to metal at a very low heat. It leaves no scale. Use it once and you will always want it.

Crescent Welding Compound

makes smoother welds than any other. It is fine for plow work or where parts are fastened together before welding, or for making split welds, finishing heats, or for welding under dies, etc., etc. It insures smooth finish and perfect welds on Toe Calks.

"Money back" from any jobber if "E-Z" or Crescent does not give perfect results.

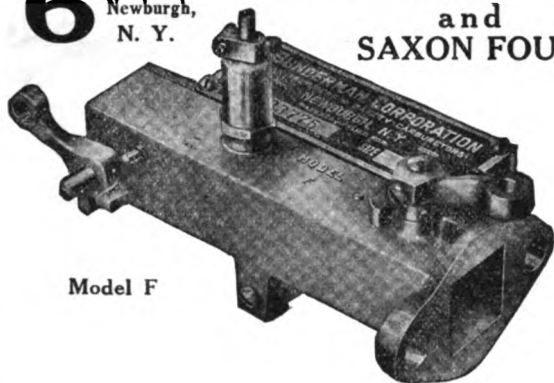
We Will Send Samples Free.

Made only by

Anti-Borax Compound Co.

FORT WAYNE, IND.

\$6 F. O. B. For FORD, METZ
Newburgh, and
N. Y. SAXON FOUR



Model F

SUNDERMAN VACUUM CARBURETOR

Saves 30 to 50% in Gasoline. Improves Any Motor. Increases Mileage in Proportion. Flexible—Climbs Hills Better. Gives Greater Power. Quicker Pick-up—Faster Get-a-way.

The Sunderman Carburetor has produced marvelously increased mileage and effected an economy of from 30 to 50% in gasoline on the great majority of all the cars on which it has been installed. We have thousands of testimonials to prove this.

It gives a much greater range of speed and power to any motor, and it gives even a Ford that flexibility that is dear to the heart of the owners of bigger, many-cylinders cars.

Order a sample carburetor from us today, or ask your jobber or dealer. We are doing a tremendous business this year—but only because our carburetor is making good consistently.

Do it now — Send in Your Order.

Sunderman Corporation, 42 Chambers Street,
NEWBURGH, N. Y.

Pacific Coast Branch: 593 Market St., San Francisco, Cal.



AUTO REPAIR WORK PAYS

and the blacksmith who has a set of taps and dies is not only prepared to do the thousand and one jobs found in the days work but he is prepared to take on auto and tractor repair work as well.

COMBINATION SCREW PLATES

contain taps and dies for cutting both U. S. S. and S. A. E. (Automobile) standard threads. Every tool guaranteed. Send for catalog.

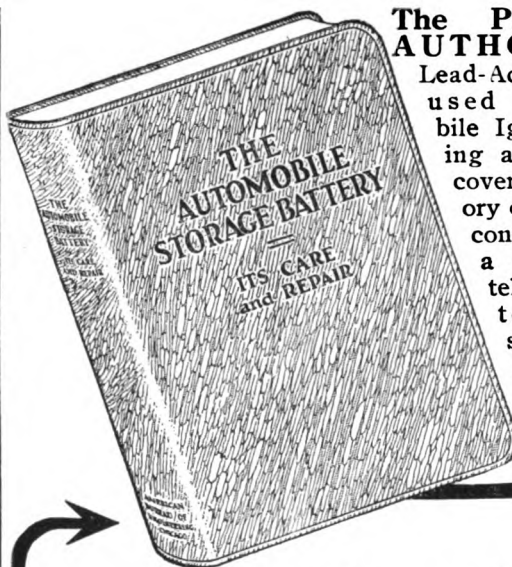
Greenfield Tap and Die Corporation

Greenfield, Massachusetts, U. S. A.

New York, 28 Warren St., Chicago, 13 South Clinton St.

Detroit Office 74 Congress St. W.

Canadian Plant, Wells Brothers Co. of Canada Limited, Galt, Ontario



The **PRACTICAL AUTHORITY** of Lead-Acid Batteries used for Automobile Ignition, Starting and Lighting, covering the theory of design and construction. In a simple way tells just how to repair, re-store and re-build to secure full power and efficiency.

The ONLY BOOK that deals extensively of all repairs that can be practically made, written by an experienced engineer with the aid of many expert repairers.

It Deals with Batteries

from every view-point. The novice can read and understand, as well as the engineer. The most complete information ever published. Invaluable for repairers in every battery garage or service station.

Special Instructions for different types of batteries in general use.

The book contains 280 pages, with 186 illustrations, graphs and charts, the section devoted to Rebuilding has 131 cuts, many from special photographs, detailing repair methods.

5 Days Free examination and refund of purchase price if not satisfactory.

Handsomely Bound in Flexible Leather Cover **\$5**

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1048 So. Wabash Ave. Chicago, Ill., U. S. A.

Date....., 19.....

You may send me at once one copy of The Automobile Storage Battery, for which you will find enclosed: check ☐. Money Order ☐. Draft ☐ for Five (\$5.00) Dollars. It is understood that if the book is not entirely satisfactory to me, I may return it within five days at your expense and you will refund my money. I am the judge as to satisfaction.

Signature

Place

Street and Number

Do Tire Repairing New Profits for the Blacksmith

Tire repairing is your logical "next move" as a new business or a new department of your shop.

More and more cars are going into service and wearing down tires every day; tire prices are raising; motorists must practise thrift and have their tires repaired over and over again. The demand for tire repairing is increasing—there is a shortage of men to do the work.

Men of all Ages Make Good

This kind of work is easy for a Blacksmith; hundreds have gone into it and made good; it pays good profits *right from the start* and increases steadily.

You can start on small capital and add equipment as your trade grows. Win back the trade of your old customers who now have autos; get the transient business that now passes your doors. But *start right*—with the most approved equipment—

Akron-Williams

TIRE REPAIR EQUIPMENT

Designed and Perfected by the Foremost Tire Engineers. Used, Sold and Recommended by All Leading Tire Companies

OVER 100 TIRE COMPANIES

use Akron-Williams outfits and recommend and sell them to their Dealers all over the world. *Think what that means!* Could there be any stronger endorsement of their efficiency and money-making features? We offer you a choice of the same outfits; a size for every shop.

Complete Instructions in All Branches of tire and tube repairing is arranged for Akron-Williams users, under the personal direction of experts in the big tire factories—and we help you locate where opportunity is Best.

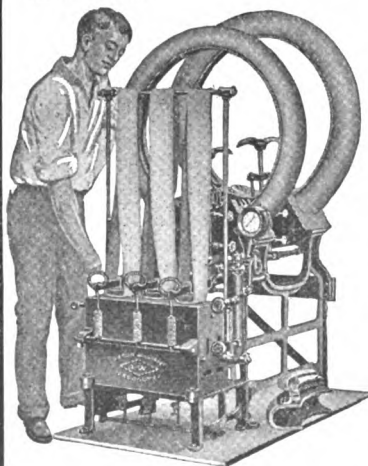
Write, or fill in Coupon—TODAY

Prompt Shipments

The Williams Foundry & Machine Co.

Adams Street

AKRON, OHIO



AKRON-WILLIAMS
A-W
PRODUCTS

THE WILLIAMS FOUNDRY & MACHINE CO.

Adams Street, Akron, Ohio

You may send me catalog prices and full information regarding your tire repair equipment.

Name

Street

City & State

KEYSTONE

If anyone knows how to judge a good spring, YOU ought to!

It takes the man who has made springs himself to know what's what in a spring. And it wouldn't take you long to find out that KEYSTONE SPRINGS are just what you want to have in stock when making broken-spring replacements.

That's because KEYSTONES are made by blacksmiths—vehicle-spring smiths who have been in the business for over 45 years.

A trial will convince you—and also convince your customers that YOU'RE THE ONLY MAN in your section to come to for spring repairs.

Order from your jobber today.

Our booklet on "AUTOMOBILE SPRINGS" will interest you. Write for it.

Keystone Spring Works

Established 1870

13th & Buttonwood Sts., Philadelphia, Pa.

WARNS!

DOES NOT FRIGHTEN

Here it is

The most beautiful warning signal ever produced

Liberty Siren

SINGS LIKE A MOCKING BIRD

Every motorist wants one. It's the perfect warning signal—trills like a bird—plays 1000 different tone combinations—adds class to any car.

Easily attached to exhaust manifold—saves the battery—is self-cleaning and indestructible. Controlled from dash or steering wheel. Price \$3.50 complete.

Fits all cars.



Dealers

Ask your jobber—if he can't supply you, write us, mentioning jobber's name.

LIBERTY ACCESSORIES CORP.
1140 Chestnut St. ST. LOUIS, MO.

\$3.50
Complete

QUICK, PERMANENT TIRE REPAIRS

—without the use of heat or tools!

Guaranteed to make a perfect patch that will not loosen, leak, creep or blow out



HERE is just the patch every progressive repairman needs for quick repairs. Does the work so well that machine-vulcanizing is unnecessary. A great seller for road-side repairs.

Just study the above cut and you'll see why the 20th Century No. 6 Patch outsells and outlasts any other wherever it is known. Note the raw red rubber next to the tube, which insures positive, permanent contact at all times. Observe the strong, wear-resisting backing of best-grade khaki-cloth. And consider the fact that between these two plys is a ply of best grade cured rubber which makes the Patch absolutely LEAK-PROOF in every respect. Then try it on a tube and prove to yourself that it is all it is represented.



Handy Outfit for Road Repairs Outfit Complete—Patch, Sand-paper and Cement, in screw top carton.

MADE IN FOUR SIZES:

2¼ x 16,	36 sq. in.	\$.50
4 x 15,	60 sq. in.	.75
6½ x 20,	130 sq. in.	1.50
7 x 75,	525 sq. in.	4.00
(Garage Size)		

Live Jobbers everywhere carry the 20th Century Line. If yours does not, send in your order direct.

20th CENTURY TIRE PROTECTOR CO.,
MIDLOTHIAN, TEXAS.

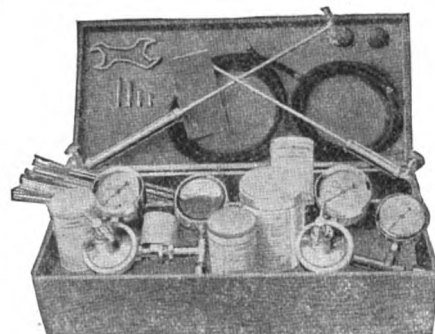
Manufacturers of a full line of tire-repair patches and outside tire-boots. Write for circulars.

ARE YOU AN EXPERT?

EVERY man must be an expert in his line to attain success, but he must have the necessary equipment to be an expert. The NIEHOFF DEFECTOMETER opens up a big field for dealers and repairmen on electrical repair work. It is something you need to locate shorts in armatures, condensers, slip rings, etc. It finds the trouble quickly and doubles your efficiency. We also make thoroughly tested condensers, slip rings, etc., and do perfect armature rewinding. Write for further information.

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Electrical Laboratories
232-242 E. Ohio Street, Chicago, Illinois

The Admiral Welding Equipment \$60.00



OVER 7,000 IN USE

handling all kinds and sizes of work. You could not buy a welding outfit at any price that would handle a greater range of work more efficiently or more economically.

When materials are as scarce, and new parts as high-priced and difficult to secure as at this time, and every pound of metal and the utmost efficiency from every machine is needed for winning the War, it is the duty of every blacksmith to equip his shop with an efficient, practical welding outfit.

The Admiral Welding Equipment sells at a reasonable price and is giving universal satisfaction to our thousands of customers. We feel sure it will please you.

Ask for Catalog.

Admiral Welding Machine Co.,

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Let the WILLIS WELDER Do Your Work



With this oxy-acetylene worker you can cinch trade in your neighborhood that your competitor cannot get.

More Work, better Results, more satisfied customers, More Money. Does that sound good to you?

Get our catalog and let us prove some of the results of proper welding.

If your Dealer cannot supply you, we can. Write direct.

HENDERSON-WILLIS
Welding & Cutting Company
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Service

CAR owners will generally estimate the quality of your service by the quality of the product you sell.

Satisfaction to car owners—satisfaction and profit to dealers—that is the ultimate aim of Harvey Service.



THERE'S A HARVEY JOBBER NEAR YOU
Our new catalogue giving Complete measurements
of over 900 Styles of Springs is yours on request

HARVEY SPRING & FORGING CO.

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Money-Making Devices for the Auto Repairman

Ekern's Grease Gun—the handiest shop tool. Pays for itself over and over again. Portable so it can be easily moved about the shop. Registers the exact amount of grease or oil sold to a customer. Keeps the grease off the floor and prevents waste.

Model K \$47.50

McParo Co.

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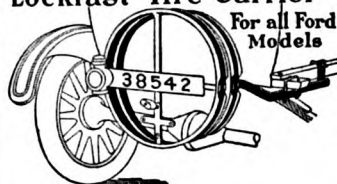


Model K

LOCKFAST Thief-Proof Tire Carrier

FITS ALL FORD MODELS
Simple in Construction. Strong and durable. Easy to install.
SATISFACTION GUARANTEED

Lockfast Tire Carrier



For all Ford
Models

Type A for one tire.....\$5.50
Type B for two tires.....\$7.00
Type C for one De-
mountable Rim.....\$5.50

For extra strength Running Board
Side Carriers add \$1.00 to the above
prices.

If your dealer or jobber will not supply you, write to us and mention his name.

THE LOCKFAST MFG. CO.

2401 Superior Ave., N. W.

Cleveland, Ohio

CHAS. M. FOSTER, Sales Director

243 Columbus Ave.,

Boston, Mass.

The Oldest Established Welders in the Country

Manufacturers of high-grade welding apparatus,
welding materials and flux since 1903.

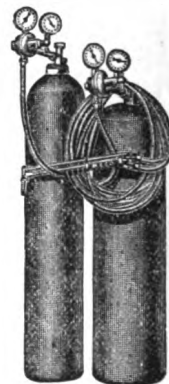
*The only firm that can weld aluminum
crank cases and cylinders without warping
or pre-heating.* All work guaranteed
absolutely against warping.

Cylinder-grinding, gear-cutting and case-hard-
ening a specialty. Write for our new circular.

AMERICAN WELDING CO.

H. G. DONIGAN, Mgr.

23rd & Olive Sts., ST. LOUIS, MO.



SPRINGS IN STOCK FOR ALL CARS
90,000 Springs. 588 Types.

6—FACTORY BRANCHES—6

St. Louis, Mo., 1402 Chestnut St.
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FACTORY RICHMOND, IND.
JENKINS VULCAN SPRING CO.

Perfect Piston Packing

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A-ONE-PIECE-RING GILL PISTON RINGS are self fitting, ONE-PIECE rings of sturdy construction. They have a distinctive joint which absolutely prevents the escape of compression, the formation of excessive carbon or the pumping of oil into the combustion chamber.

Ask your JOBBER for GILL PISTON RINGS, or write us today.

Gill Manufacturing Co.,

351 W. 59th St., Chicago

PRICES SMASHED

50 PER CENT OFF

STUDY THESE PRICES

Compare Them With Others.

5,000 to 10,000 Miles With Co-Op Tires

Co-Op Tires are Rebuilt along Scientific lines. They are sturdily made of the very highest grade of black tread rubber and built over the same high grade fabric used in the standard advertised tires selling at 3 or 4 times the price we ask for Co-Op tires.

From factory to you. Hundreds of dealers are making big money by selling Co-Op tires.

Don't make the mistake of your life by overlooking this opportunity. To use Co-Op Tires once is to use them always.

CO-OP TIRES GIVE REAL MILEAGE—NOT ADJUSTED MILEAGE.

CO-OP TIRES WILL HOLD UP WHERE OTHERS FAIL.

CO-OP TIRES ARE BLACK RIBBED THREAD CORD TYPE TIRES

Printed Standard Guarantee of 5,000 miles attached at additional cost of 25%. Most dealers prefer to carry their own guarantee & add 25% to their profits. If you want the guarantee, it is up to you Mr. Dealer.

SEE THESE PRICES:

Tires	Tubes	Tires	Tubes
28x3 \$ 8.75	1.85	35x4 \$19.95	\$3.75
30x3 9.45	2.20	36x4 20.25	3.00
30x3½ 11.95	2.40	34x4½ 22.95	4.05
32x3½ 13.25	2.65	35x4½ 24.25	4.15
31x4 17.25	3.10	36x4½ 25.90	4.25
32x4 18.10	2.25	37x4½ 26.75	4.35
33x4 18.95	3.40	35x5 28.00	4.55
34x4 19.50	3.60	37x5 31.00	5.00

PRICES OF ODD SIZES ON REQUEST

Increase your profits now—Deal in Co-Op Tires.

Stock them—now is the time

We ship all orders C. O. D. Send \$1.00 deposit for each tire, or better yet, send full amount with order and we allow 5 per cent cash discount and save 25c C. O. D. return charges. An extra 5 per cent discount on all orders of \$100 or more.

BE ECONOMICAL—take advantage of all the discounts. Do not hesitate to send money in advance. WE SHIP SAME DAY ORDER IS RECEIVED AND PRIVILEGE OF EXAMINATION PROTECTS YOU.

We are just as careful of orders for one tire as we are of 500 tires.

Co-Op tires will make you the biggest tire merchant in your town. LET US PROVE IT.

SEND IN THE COUPON THIS MINUTE

Ship to.....
 Town..... State.....
 How many..... Size.....
 Rim Style..... Inclosed find \$.....
 CO-OPERATIVE TIRE AND SUPPLY CO.,
 Manufacturers—Distributors 323-325 E. 33rd St., Chicago, Ill.

Auto Tire Dealers and

Automobile Users Attention

Here is your chance to purchase a High Grade, 5000 mile tire which is built of Sea Island Cotton Fabric and Pure Gum Rubber. The tire that is built right to give the right Mileage. These tires are not Seconds. They were built as Firsts. But because they are a little mold blemished which does not defect the service of the tire, therefore we sell them at a BIG REDUCTION.

COMPARE THE PRICES

Regular Price	Our Price	Regular Price	Our Price
30x3 Pl.....\$15.20	\$ 8.35	34x4.....\$34.55	\$20.75
30x3 NS..... 15.85	9.50	34x4½..... 46.60	26.50
30x3½..... 20.65	12.40	35x4..... 48.60	27.70
32x3½..... 24.25	14.55	36x4..... 49.40	28.15
31x4..... 31.75	19.00	35x5..... 55.55	31.65
32x4..... 32.30	19.40	37x5..... 58.80	33.50
33x4..... 33.70	20.20	37x4½..... 53.90	29.50

SPECIAL PROPOSITION TO DEALERS

We also carry a complete stock of Standard Make Used Tires

BEST VALUES EVER OFFERED FOR THE MONEY.

30x3.....\$4.00	33x4.....\$ 7.50	35x4½.....\$ 9.50
30x3½..... 5.00	34x4..... 8.00	36x4½..... 9.50
32x3½..... 6.50	35x4..... 8.50	35x5..... 10.00
34x3½..... 6.50	36x4..... 9.00	36x5..... 10.50
36x3½..... 7.50	37x4..... 9.50	37x5..... 11.00
32x4..... 7.00	34x4½..... 9.00	

SPECIFY STYLE OF RIM TO AVOID DELAY

\$1.00 deposit required with each tire ordered. Balance C. O. D.

SUBJECT TO YOUR EXAMINATION

ROYAL TIRE & SUPPLY CO.

1461 Michigan Ave.,

Dept. G

Chicago, Illinois

Phone—Calumet 2553

"First Made in America."

Hay-Budden Solid Forged Anvils


HAY-BUDDEN MFG. CO., Brooklyn, N. Y.



200,000 IN USE.

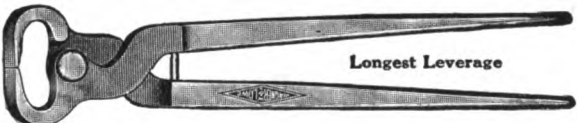
Entire top being in one piece of high-grade forged steel, makes a loose face impossible.

Widest Opening



Horseshoers who have used them use no others.

For sale by all leading Jobbers



The Wagner & Lowe Hoof Nippers are drop-forged from the best tool steel, hand tempered and hand finished throughout.

The Lowe Manufacturing Co., Enderlin, N. Dak.

FREE

512 Pages of Bargains

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WE WANT to SEND YOU THIS 512 PAGE MONEY MAKING BOOK

It is our New Net Price Catalog for Blacksmiths, Wagonmakers, Horse-shoers, and Automobile Repairmen. It contains thousands of articles you can use in your business and thousands you can sell to your trade on which you can make good money; 3,000 illustrations. Tells how you can work up a profitable auto supply and repair business. Serves as a price guide on all supplies for blacksmith, carriage and wagonmaker, horseshoer, and auto repair man. It is a book that will save you money on anything you need in your shop and make you money on the thousands of things you can sell to your trade.

Write for your copy today, sending business card, letterhead or some other evidence that you are in the trade.

CRAY BROTHERS,
1113 W. 11th Street,
Cleveland, Ohio, U. S. A.

CARRIAGE HARDWARE AND AUTO ACCESSORIES,
Cleveland, Ohio, U. S. A.

YOU CAN WELD STEEL AS EASILY AS IRON



CLIMAX WELDING COMPOUND
TRADE MARK
REGISTERED AUG. 22 1905.

Especially adapted for welding tires, axles, springs and all lap welding.

Either of these compounds will weld steel at the lowest possible heat that steel can be welded. Also protects steel at high heat.

Owing to our improved process of manufacturing, these compounds do not boil off and waste in the fire, but adhere to the metal when applied.

FOR SALE BY ALL LEADING DEALERS IN BLACKSMITH SUPPLIES IN UNITED STATES AND CANADA

Large Free Sample Sent on Request



BORAX-ETTE
FOR STEEL
TRADE MARK
REGISTERED AUG. 22 1905
A PERFECT WELDING FLUX

PREPARED ESPECIALLY FOR WELDING FAR SUPERIOR TO COMMON BORAX

A flux which causes the steel to weld like iron. Not necessary to apply between the lap, but may be applied to the outer surface of the work, the same as borax. Has no equal for plow work. Just the thing for welding toe-calks so they can't knock off.

CORTLAND WELDING COMPOUND CO., Cortland, N. Y.

Here's Real Comfort for Working Under the Car!

BANNER

WOOD CREEPER

Price, \$2.00



MADE to fit the back. Rolls about easily on locked-in ball-bearing castors. Strongly built and will not rack or pull apart under hard usage. Convenient tool trays on both sides. Weight only 8 lbs.

Sold at such a low price that you cannot afford to be without one.

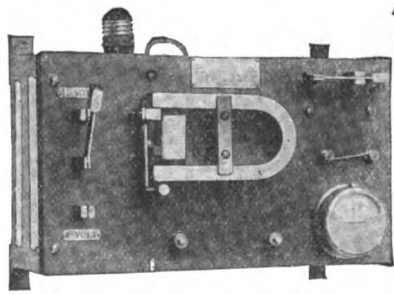
ORDER THROUGH YOUR JOBBER—TODAY

BANNER ACCESSORY MFG. CO.
ST. LOUIS, MO., U. S. A.

FORE BATTERY CHARGER

ATTENTION GARAGES AND SERVICE STATIONS!

The Fore Rectifiers are the most practical and efficient method of charging all types of lighting and starting batteries. They deliver an efficiency of 85% at all times. They come from the factory complete, ready for immediate use. We will ask that you note the simplicity of this Equipment.



TYPE 2-B. Capacity, 12 Volts
For Larger Equipments write for Catalog 101-L

FORE ELECTRICAL MFG. CO., Inc.
5645 Easton Ave.
St. Louis, Mo.



GASOLINE ECONOMY COMPANY

1112 COLONIAL TRUST BUILDING
PHILADELPHIA

Mr. Auto-Repairman,
Progressiveville, U. S. A.

Dear Sir:

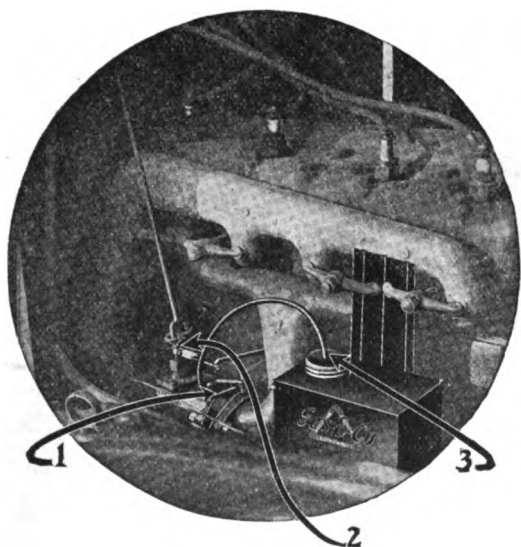
ARE YOU LOOKING FOR A CHANCE TO TAKE ON A BIG, FAST
SELLING LINE THAT'LL BRING IN A STEADY STREAM OF PROFITS
FROM THE MINUTE YOU TAKE HOLD?

Well, here you are--and it's the biggest opportunity
that's come along in an age--the local agency for
GAS-E-CO Systems in your section.

The GAS-E-CO System is an attachment for Fords that
positively reduces gasoline consumption, gives an
average increase in mileage of 30% or higher, and
absolutely wipes out carbon trouble.

It puts power and pep into the Ford engine such as
it never had before. It develops its maximum
efficiency on the present poor grade of gasoline in
a way that is utterly impossible without it.

It is bound to appeal to every Ford owner you
demonstrate it to, and the low price--only \$10--means
quick and many sales, as your
customers will readily see how it
will pay for itself in a short
time.



Let us tell you about our offer
to the trade. If you're out
"gunning" for more business,
better write today, before the
other fellow gets the drop on
you. A word will bring full
details.

Yours very truly,

GASOLINE ECONOMY COMPANY

Albert H. Kelley.

Secretary.

1. Vaporizer which maintains full efficiency of gas at all speeds.
2. Needle-valve control which holds consumption of gas to a minimum.
3. Decarbonizer which supplies engine with moisture and eliminates carbon.

“Buffalo”

AT CORNELL

At Cornell University they coach real blacksmiths in the science of horseshoeing.

Horses have a habit of walking and defects in their feet and legs which require special attention and must be corrected with special shoes.

Prof. Asmus of the New York Veterinary College, Cornell University, is a horseshoeing expert—he knows how to shoe horses—and he is teaching others how to shoe them.

Every year he has classes of men—old men and young men—who make blacksmithing their business, who come to learn more about their business.

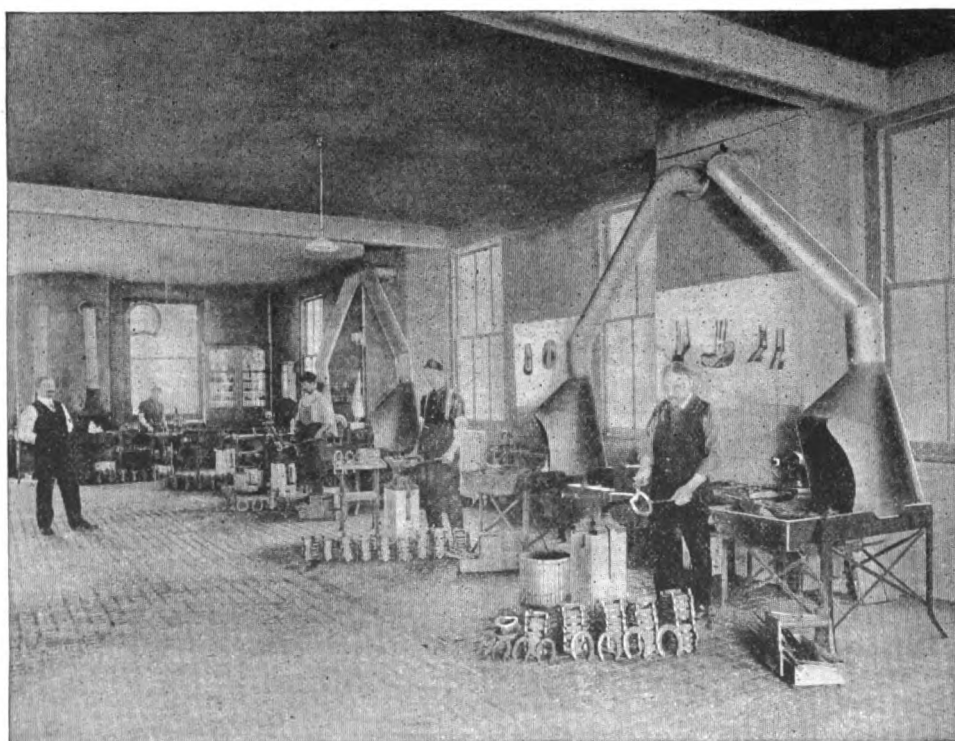
Needless to say, they use only standard equipment, Buffalo Forges are standard—and Prof. Asmus has selected them in preference to any other kind.*

Since this advertisement was written we have received an order for twelve additional forges from this college.

Write Dept. 1; for Catalogs No. 100 and 108 showing complete line of forges.

BUFFALO FORGE COMPANY

BUFFALO, N. Y.



To Employers and Important Executives— A Government Proclamation The Army Needs Your Influence in an Emergency

This is a man-to-man appeal for you to help the Government grasp a great opportunity, and for you to discharge a grave responsibility.

The Allied program to speed up the war and quickly bring about the final overthrow of the German Armies calls for an immediate mustering of America's final contribution of man-power. We must raise our army to 5,000,000 men at once!

Nearly 3,000,000 of the needed 5,000,000 are already under arms—but Class 1 of the Draft will be exhausted by October 1. To go into the deferred classifications and take men essential to industries, and men with dependent families, is unwise.

A new Class 1 must be created at once. Laws are being framed calling upon men within certain ages to register (the War Department's recommendation is for 18 to 21 and 32 to 45 years as the age limits), and the President will appoint a Registration Day early in September.

Thirteen million men must register in a single day. Later these men will be classified. Industries will not lose men who are absolutely essential to them, and families will not lose their bread-winners. But every man must register.

You are a Center of Influence

As an employer or an important executive you are a center of influence, and the Government needs your active co-operation in putting through this gigantic task without confusion or delay. Thirteen million men

must be *told* of the law between now and Registration Day (watch newspapers for date); and they must understand the *why* of it, and just *where* and *how* they are to register. For these details ask your



Watch the newspapers for the date and further details

Contributed through Division of Advertising



United States Govt. Comm. of Public Information

Local Board, or your city or county clerk.

You can reach the men in your employ more effectively than they can be reached from the outside. We earnestly urge, therefore, that you make definite plans, in the interest of a speedy VICTORY, and in the interest of your own business, to see that all of your men are properly informed, so that they can be promptly and correctly registered when the day comes.

Every man between the ages to be specified in the President's Proclamation must register.

How you can help

Start at once to get in touch with your men. Bring to their attention the *need* for the registration and the *facts* about it. Get in touch with your Local Registration officials and co-operate with them.

Here are a few suggestions:

Arrange for talks to your men; place inspirational and informative bulletins on bulletin-boards; establish Selective Service Information Bureaus; inclose slips in your men's pay envelopes.

Arrange for definite hours when the men in the different departments or sub-divisions of your business shall be allowed time to go and register. Post full lists of the men in your employ between the specified ages, the men to check off their names after they have registered.

Many other ideas, applicable to your own business, will doubtless occur to you.

This is an emergency such as this country has never faced before, and the Government must depend upon you to bring all of your influence and inspiration and ingenuity to bear out this problem, that this crisis in the war may be met in a way that shall avoid hardship to the business and families of the Nation.

Signed:

E. H. CROWDER

PROVOST MARSHAL GENERAL

Approved:

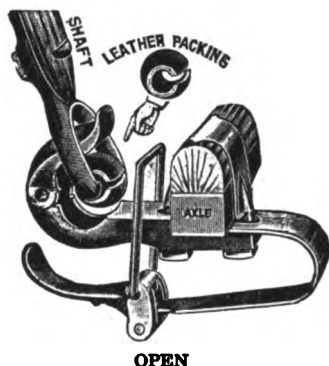
NEWTON D. BAKER

SECRETARY OF WAR

This space contributed for the Winning of the War by The Publisher

American Blacksmith Auto Tractor Shop.

THE BRADLEY BALL-BEARING Carriage Coupler



The Bradley Ball - Bearing Carriage Coupler is made entirely of steel.

Every part, except the flat spring and the loop, are steel forgings made from the bar under mighty drop hammers.

The flat spring is cut from high grade, crucible sheet steel, formed when hot and then carefully tempered and tested.

The loop is of special stiff steel wire.

Not a piece of malleable iron or other inferior or unreliable material is used.

The leather packings are in one piece and moulded to shape in machines made especially for this work.

The retaining rings keep the leather packings in place and are indispensable where shafts and poles are frequently removed.

Placing the loop over the end of the cap and drawing the thumb lever back against the flat spring closes the coupler, locks it and takes up any wear of the leather packing.

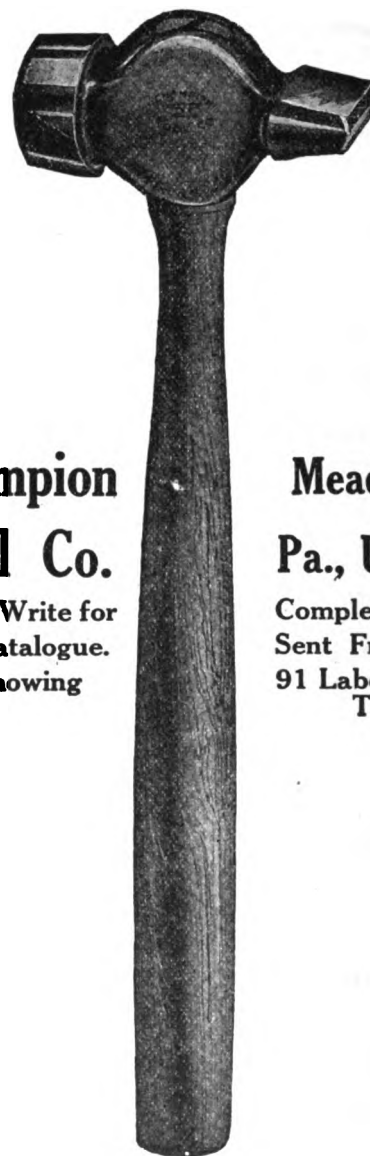
An absolutely non-rattling, quick-shifting carriage coupler.

Circulars and prices upon request.

C. C. BRADLEY & SON
SYRACUSE N. Y.

YOU

OWE IT TO YOURSELF TO USE
THE BEST TOOLS TO ASSIST
IN YOUR WORK



**Champion
Tool Co.**

Write for
Catalogue.
Showing

**Meadville,
Pa., U.S.A.**

Complete
Sent Free.
91 Labor Saving
Tools

No. 12 Electric Sharpening Hammer.

Weights 1½ to 3 lb.

Corrugated Pein prevents shoe slipping
from anvil, making every blow count.

**Drop Forged
Correctly Tempered
Swings Just Right**

Horse Shoe Bar Iron

MADE BY

The Milton Mfg.
Company

MILTON, PENN'A

Is of Superior Strength
and Quality. We can prove
it. Write us.

Edwards Shears

For twenty years the Two Leading
Low Priced Shears in the U. S. repre-
senting the Greatest Value for the
Least Money.

No. 5, weighs 200 lbs., cuts 4x½ in. soft steel
No. 10, weighs 430 lbs., cuts 4x¾ in. soft steel
At their price you should have had
one long ago. Order one from the
first iron man that calls on you. They
All Sell Them.

Write for descriptive circular and prices.

C. D. EDWARDS MFG. CO.,
Albert Lea, Minn.



YOU CAN'T CUT OUT A BOG SPAVIN OR
THOROUGHPIN
but you can clean them off promptly with



ABSORBINE
TRADE MARK REG. U.S. PAT. OFF.

and you work the horse same time.
Does not blister or remove the
hair. \$2.50 per bottle, delivered.
Will tell you more if you write.
Book 4 R free. ABSORBINE, JR.,
the antiseptic liniment for mankind,
reduces Varicose Veins, Ruptured
Muscles or Ligaments, Enlarged Glands, Wens,
Cysts. Alays pain quickly. Price \$1.25 a bottle
at druggists or delivered. Made in the U. S. A. by
W. F. YOUNG, P. D. F., 230 Temple St., Springfield, Mass.

SHOP AND TOOLS FOR SALE—Machin-
ery consisting of one 4 horse power gas
engine, pulleys and lineshaft, large emery
stand with stones, and polishing wheels, disc
sharpener, drill, acetylene welding outfit, de-
carbonising torch, foot power emery wheel
and lots of other hand tools. Shop can easily
be turned into a garage. Good business and
good location. Price is \$1550. Reason for
selling poor health.

Edw. F. Retzlaff, Winalow, Ill.

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Iron Company

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Inner armor for automobile tires. Pre-
vents punctures and blowouts. Double
mileage of any tire, old or new. Easily
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in several tires. Will not heat or pinch. Cheaper and
better than double treads, etc. Details free. Distrib-
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Prentiss
Patent Vises
BEST MADE
Large Illustrated Catalog Free
Prentiss Vise Co., Hardware Bld., New York

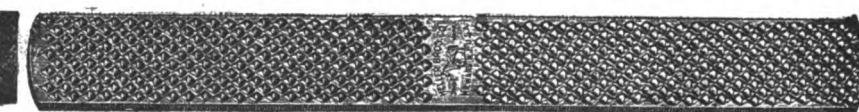
WELDING PLANTS, \$25.00 to \$300.00

Designed for all purposes. Small cash payment; balance, three to six months.
Every mechanic and shop should have one.

A. J. P.-BERMO CO.

OMAHA, U. S. A.

THE HORSE RASP OF QUALITY



Ask your dealer for the IMPROVED HELLER RASP with keen cutting hard teeth. Made in all patterns and
cuts, "Slim," "Light," "Slim Light," and "Fine Cut." Insist on getting the size, kind and cut best suited for your
work. It will pay you to give them a trial. New catalogue mailed free on application.

ESTABLISHED IN 1836

HELLER BROTHERS COMPANY

NEWARK, N. J.



The Surety of "F-S" Products has been proven in the last 50 years.

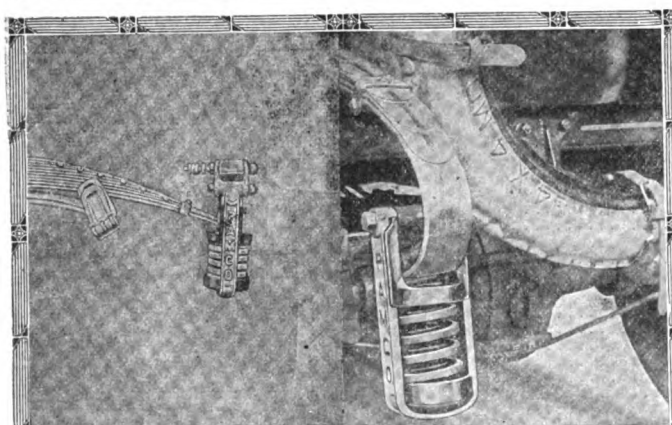
There will be no question of the successful finish of your fine job when you use "F-S" Quality Coach, Carriage and Automobile Varnishes and Japans. Their reputation for "Surety" satisfaction has been gained thru half-a-century of use.

FELTON, SIBLEY & CO., Inc.

Manufacturers of Colors, Paints and Varnishes since 1863

No. 136-140 N. 4th St., PHILADELPHIA

153



PLATFORM SPRING SEMI ELLIPTIC

PAMCO
QUADRUPLE SPRING

SHOCK ABSORBER

--a **BIG** seller for your trade

Lessen Spring Breakages

Protects the car and transmission

Adds comfort and long life to the car

Cuts tire bills 30 to 50%

Outlasts any car

Unconditionally guaranteed.

There are 6 big convincing reasons why PAMCOS will appeal to your trade. The quickest, best-selling shock absorber on the market.

Write at Once for Prices and Information

AUTO DEVICES COMPANY

3212-14 Locust St.,

ST. LOUIS, MO.



Put these efficient watchmen on the job of guarding your rasp bill.

Let NICHOLSON rasps prove themselves a decided factor in lowering cost production.

Nicholson Rasps

Save You Money



See that this brand is on every Rasp you buy

Specially selected steel, arrangement and pitch of the teeth, and uniform hardness give NICHOLSON rasps a cutting and wearing quality that is unequalled.

The omission of teeth at the extreme ends is a feature that practical horseshoers appreciate—it saves the hands from the sharp teeth.

Made in all regular sizes, and in the new 18-inch Slim, which gives the user the advantage of a long stroke, and at the same time a rasp of medium weight.

Sold by Leading Dealers

NEW
18-inch Slim
Horse Rasp

**Catalog Sent Free
on Request**

Nicholson File Co.
PROVIDENCE, R. I.

LINDE OXYGEN

From Coast to Coast 65 Producing Plants and Distributing Stations provide an unlimited supply of Linde Oxygen for users everywhere.

LINDE SERVICE means no investment except for oxygen actually received—no expensive overhead or upkeep charges.

Linde Oxygen may be obtained from any of the following Linde Plants and Distributing Stations where a large supply of charged 100 and 200 cu. ft. cylinders is kept on hand constantly to insure immediate shipments.

Mail or telephone your order to THE LINDE AIR PRODUCTS CO., at the nearest point. Shipments will be made on day order is received.

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Newark
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| California
*Emeryville, Oakland
*Los Angeles
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Albany
Montgomery & Colonie Sts.
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(*) designates plants

Other plants and Distributing Stations are planned for other industrial centers throughout the country and will be established as fast as and wherever the local demand for oxygen warrants.

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Largest Producers of Pure Oxygen in America

Forty-Second St. Building, NEW YORK

We Tear 'em up and Sell the Pieces

We save you 50 to 75 per cent on auto repairs. Can supply most any part needed.

Our Guarantee—If not satisfactory, can be returned, and money refunded.

Auto Wrecking Co.

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KANSAS CITY, MO.

A Ford Starter that's the real thing—the SIMPLEX \$12.50 Trouble-Proof

STARTS the Ford from the seat. No cranking—no batteries—no kick. Easily and quickly attached—fits any Ford car.

Dealers! Here's a little wonder as a fast seller to Ford owners. You are fully protected by our positive guarantee. Write today for literature and trade discounts.

SIMPLEX MFG. CO.
Box 263 Anderson, Indiana



BLACKSMITHS WELDERS!!!

Put your shop on a War Saving Basis

Millions of dollars worth of metal parts being discarded daily and lying around in scrap-piles are needed to speed war work.

SAVE—every broken or worn part by the *Economy Process* of oxy-acetylene welding.

SAVE—50% on your acetylene bill by making your own gas right at your shop, with the *Economy Generator* (made in 30, 35, 50 and up to 300 pound carbide capacity sizes.)

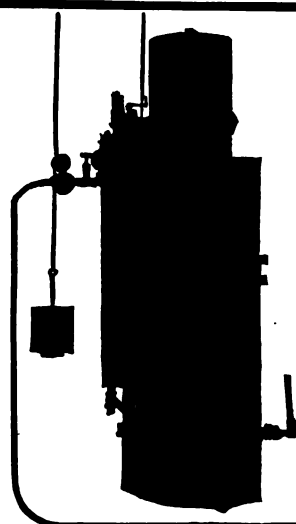
SAVE—time and money lost through being out of acetylene and draying of cylinders to and from depot.

A post-card mailed us *Today* will bring *Big Facts* as to the savings you can make with the 30A Outfit shown here (this outfit is being used today by hundreds of leading blacksmiths, repair shops, manufacturers, etc.)—also, we'll send you our latest folder:—*Economy—From a Patriotic Standpoint*—describing the *Economy Semi-Automatic Generator*, which is preferred by many welders to the more expensive automatic feed type. It has the advantages and conveniences of the automatic feed—At One-Half The Cost!

Economy Welding Machine Company

213 Southwest Boulevard,

Kansas City, Missouri



What you next Liberty Loan *Read this carefully—then ACT*

THE three Liberty Loan issues already successfully floated have been put over by the win-the-war spirit of the American people.

In connection with the great work of awakening and quickening to action the spirit of war sacrifice which has been the greatest factor in the success of Liberty Loans it would be impossible to put too high a valuation on the splendid voluntary work of American business men, bankers, labor leaders, and moulders of thought in all professions and occupations.

The very success of this volunteer leadership in creating enthusiasm has shown the desirability of organized methods for increasing its usefulness. And particularly to suggest to those leaders who feel that their circle of action is relatively small the enormous amount of good they can do as a whole if each no matter how small or great (relatively) his sphere may be, will act with enthusiasm and system. The great factory or store, society or club, church, or other organization with, say 5000 employees, members, or audience, does a great work in "selling" the Liberty Loan idea to such an aggregation. But that work is fully matched in aggregate importance by a hundred such institutions whose average payroll, membership, or audience, comprises only fifty persons each.

The nation has much other work to do. The Liberty Loan drives are necessarily carried through largely by volunteer work. In consequence they must be limited to specific brief periods for the actual subscription to the bonds.

THESE brief sharp campaigns have the advantage of building up white-hot waves of enthusiasm, but it is extremely difficult in such periods to secure close contact with all the wage-earning and money-making units of the public and especially to bring home personally to each individ-

ual the important serious personal relation which he or she should have to the war and to the successful financing of it.

To the accomplishment of that great end it is now proposed that the leaders of thought and action in America and especially the employers of labor, great and small, whether in store or factory, whether engaged in production or distribution,

hold a meeting of your employees shortly previous to the Fourth Loan campaign, not to take bond subscriptions but to arouse serious enthusiasm for the forthcoming Loan.

WHERE organizations are small, as for example small stores, similar organizations in the same or related lines of business can be invited to participate in one meeting. As for example, all the grocers in a small city, or all those in a given section in a large city, might get together in one meeting. But it would be a grocers' meeting. In such cases it would usually be wise to keep related trades together.

Whether the audience be great or small, every effort should be made to "stage" the meetings effectively, to make them interesting and instructive and above all to give employees themselves an opportunity to speak, to discuss, to suggest, to enthuse their fellow employees.

It is not essential that such meetings be called Liberty Loan meetings—they would better be an-

"Win-the-War" Meetings need not be limited to gatherings of employees. They can be equally effective if organized as "town meetings"—or by clubs, societies, churches, lodges or similar institutions. Leadership, organization, and a definite program will work wonders.

can do NOW to help the

nounced as "Win-the-War" meetings, and above all it should be made clear that no attempt will be made at these meetings to secure or accept subscriptions for Bonds or money for any purpose whatever—but in all the speaking and discussion attention should be largely devoted to the forthcoming Loan.

The Fourth Liberty Loan Campaign will begin on September 28th.

All of the preliminary meetings should be held not earlier than September 10th and not later than September 25th, unless there are special circumstances which would make an earlier or later meeting expedient.

THE LIBERTY LOAN BUREAU has prepared a booklet setting forth "Suggested Programs for Meetings to Prepare for the Fourth Liberty Loan."

They have asked us as publishers of a business paper to bring this suggestion or patriotic service to the attention of our readers and to urge its hearty adoption by all stores, factories, employers of labor in any capacity, societies, club or organizations of any kind who can arrange such meetings.

We have been furnished with copies of the booklet giving "Programs or 'Win-the-War' Meetings"—and will send a copy promptly to anyone signing the coupon below and mailing it to us. The signing of the coupon is your pledge to hold such a meeting either of your employees or of some similar group which you can bring together previous to the Fourth

Liberty Loan Campaign and your pledge when received will be turned over to the Liberty Loan Bureau and officially acknowledged.

Such meetings organized in the "Win-the-War" spirit will not only help tremendously to insure 100 per cent subscriptions to the Fourth Liberty Loan among employees of industrial and commercial concerns, they will do more than almost any other one thing could to develop among all ranks of the public the stern spirit of sacrifice and the necessity for loyal, constant, steady service of each and every one in the great national work of victory for the cause of Liberty and Democracy.

They will serve to educate and make clear to all the vitally important way in which work and sacrifice here in our midst help and sustains the work of our fighting men "over there."

This is an opportunity for every American business man to do a great and helpful work for the Fourth Liberty Loan and one which will help win the war.

There is plenty of time for efficient action. There is no time to lose in preparing for that action.

**American Blacksmith
Auto & Tractor Shop
Buffalo, N. Y.**

**Sign the Coupon
Mail it to**

**American Blacksmith
Auto & Tractor Shop**

New Sidway Bldg.
Buffalo, N. Y.

**Get the Book
Hold Your Meeting
and
make it a
"hammer"**

This space contributed to the winning of the war by
AMERICAN BLACKSMITH
AUTO & TRACTOR SHOP

I pledge myself to organize and hold a "Win-the-War" meeting previous to the opening of the Fourth Liberty Loan Campaign in order to help float the Loan.

Send me †..... copy of Liberty Loan Committee Booklet giving suggestions for Programs for such meetings.

Signature.....

Position or Title.....

*Firm.....

Street No.....

City.....

State.....

Date.....

*If a Society, Club or similar organization give name here.

†If more than one copy is desired state number.

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Who can think of some simple thing to patent? Protect your ideas, they may bring you wealth. Write for "Needed Inventions," "Patent Buyers," "Millions in Patents," "Patents for Sale," "How to Get Your Patent and Your Money," and other books.
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Patent Attorney and Mechanical Expert, 622 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and exactly what it will cost. Send for circular.

PATENTS

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WANTED—New Ideas Write for How to Obtain a Patent, List of Patent Buyers, Inventions Wanted and \$1,000.00 in prizes offered for inventions. Send sketch for FREE opinion of patentability. Our FOUR BOOKS sent free. Patents advertised FREE. Victor J. Evans Co., 686 Ninth, Washington, D. C.

Inventions Wanted!
Manufacturers constantly writing us for patents. List of inventions actually requested and book "How to Obtain a Patent" sent free. Send rough sketch for free report regarding patentability. Special assistance given our clients in selling patents. Write for details of interest to every inventor.
Chandlee & Chandlee, Patent Attorneys
Est. 21 Years 411 F St., Washington, D. C.

WANTED AND FOR SALE

Want and For Sale advertisements, situations and help wanted, five cents a word. Send cash with order. No charge less than fifty cents. The small cost of these advertisements prevents our investigating and guaranteeing them. WE WILL NOT knowingly accept any but reliable ones.

AUTO TIRE VULCANIZING PLANTS—We buy, sell or exchange. Catalog is free—you save 80%. Instruction book on Vulcanizing, 75c. **EQUIPMENT CO.**, 358 Eighth St., Cincinnati, O.

FOR SALE—a Canedy Otto Drill, in fine condition. Price \$20.00. **Frank MacVicar**, 214 Milton Av., Syracuse, N. Y.

FOR SALE—Blacksmith business in connection with Garage, plenty of work. Can't handle both. **W. H. Ray**, Mathis, Texas.

BARGAINS—Furnish you names and addresses, free businesses, farms, unimproved lands, any kind, anywhere.
Western Sales Agency, Minneapolis, Minn.

Simonsen Kold Cutter No. 1
is the handiest tool you could place on your bench. Made entirely of steel yet low in price. Will cut cold $\frac{1}{4}$ x 2 or $\frac{1}{4}$ x 6 in. mild steel. Write for our circular K and learn all about this bench shear.
SIMONSEN IRON WORKS.
Sioux Rapids, Iowa, U. S. A.

CLEAN YOUR ENGINE REGULARLY WITH A

Wagner Auto Engine Cleaner
One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessary for repair shops.
Wagner Specialty Co., 1902 Broadway, New York City

PATENTS THAT PROTECT AND PAY . . .

BOOKS, ADVICE, AND LIST OF INVENTIONS WANTED FREE.

Send sketch or model for search. Highest References. Best Results. Promptness Assured.

Watson E. Coleman, Patent Lawyer
624 F Street N. W. Washington, D. C.

IMMEDIATE DELIVERY NEW MACHINES
—13 in. Jointers, \$75.00; 9 in. Jointers, \$50.00; 5 in. Jointers, \$30.00; 20 in. Band Saw, \$45.00; 14 in. Pattern lathe, \$100.00; Emery grinder, \$25.00; 50 Circular saws, Band saws, and 12 in. Jig saws—send for list. 2 in. Bignall & Keeler Pipe Machine, \$35.00, second hand. Also a number of Saw Arbors, Grindstone Fixtures, Cutter heads for Wood table Jointers, and Combination outfits. Send for circular and prices. **W. L. SHEERWOOD**, Kirksville, Mo.

FORDS START EASY IN COLD WEATHER
with our new 1919 carburetors. 34 miles per gallon. Use cheapest gasoline or half kerosene. Increased power. Styles for any motor. Very slow on high. Attach it yourself. Big profits to agents. Money back guarantee. 30 days trial. **Air-Friction Carburetor Co.**, 388 Madison, Dayton, Ohio.

WANTED—to buy a power hammer. Perfect or Little Giant. Must be in perfect condition and cheap. **O. A. Burke & Son**, Elgin, Texas.

FOR SALE CHEAP—Blacksmith and Garage business and all tools and machinery.
J. W. Chamberlain, Lackawaxen, Pike Co., Pa.

ACCESSORIES AND SUPPLIES OF INTEREST TO THE TRADE. AN EVER URGENT NECESSITY.

There is only one automobile manufactured that does not have as a part of its regular equipment a storage battery. Storage batteries have to be charged and the owner is not prepared to charge them.

As anyone knows storage batteries cannot be charged with any but direct current. Where direct current is not available, expensive and more or less complicated charging sets are demanded unless the alternating current is altered or rectified to direct current by a rectifier and this brings us to the subject of the Fore Electrical Mfg. Co., of 5645 Easton Ave., St. Louis, Mo.

This company manufactures a line of battery charging rectifiers that includes a rectifier to meet the demands of the smallest shop as well as the largest and more than this company's instruments are guaranteed.

In this space it is not possible to dwell at length on the merits of this product but the Fore company will be very glad to give you complete information and prices—which, let us say are much lower than you expect.

WIRING SYSTEMS OF EVERY CAR

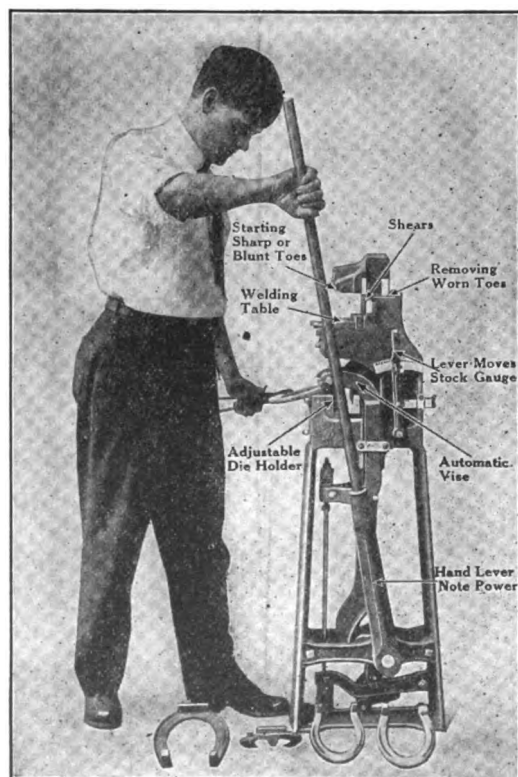
Containing 700 blueprints diagrams that completely covers the electric starting, lighting and ignition systems in practically every modern passenger automobile, and truck, the 1918 edition of the Automobile Wiring Manual is just off the press

In addition to the diagrams mentioned there are included in the new edition diagrams of the internal wiring of motors, generators, cutouts, switches, etc., of all starting and lighting systems used as well as practical instructions in the repair of these particular units.

Continued on Page 40.

1918 Model The L. S. P. Calking Machine

The Greatest Time and Labor Saving Machine on Earth



1918 MODEL
Fully covered with Patents

OUR 1918 Model is the same as our 1917 Model with the exception that we have eliminated the steel plugger attachment and strengthened some of the parts.

Do not mistake this for a machine which makes toe calks or a foot vice. This machine is for turning heel calks, both Blunt and Sharp, sticking and welding toe calks, clipping and trimming ends of shoes. **IT CALKS SHOES**, doing the work just the same as you do by hand with the hammer, only it is done much better and easier, and in a fraction of the time.

In turning heels, you can turn up just as much stock as you wish, upset or stoveup to make as heavy as you like and square up the calks without use of hammer. There is no losing of toes when you weld on the L. S. P.

It is a strong, handsome, well-made machine, and will last, as you might say, a life time, fully warranted for one year. It is in use in the best shops in the United States, users claiming more for it than we do. Write at once for full information and prices.

L. S. P. CALKING MACHINE COMPANY

Peoples' State Bank Building
Wyalusing, Pa., U. S. A.

National Machine Co.,
Brighton, Ont., Canada

EVERY SHOER
should be sure and
specify _____

PHOENIX


Horse and Mule Shoes
when ordering. Then
you are sure of get-
ting the best. A trial
will show you HOW
MUCH better they
are---Also

BULL DOG

TOE CALKS

"NEW EASY" 4 Sizes BOLT CLIPPERS "EASY" 2 Sizes

THE GENUINE TOOL



H. K. PORTER EVERETT, MASS. U. S. A.

KNOWN AND PREFERRED EVERYWHERE

EMPIRE STEEL WHEELS

Plain or grooved Tire To Fit Any Wagon Farm Trucks All Standard Types



Write today for Proposition to Blacksmiths.

Empire Mfg. Co.
P. O. Box 308
QUINCY, ILLINOIS

YOUR FINAL VERDICT Vulcanizers

MILLER'S or ANDERSON for every use. 80 - Page Catalog free on request. Free Instructions.



COMPLETE CURE ONE HEAT

Extra Ply Tires

Exclusive Territory Given. Write, yours may be open.

Address Dept B
CHAS. E. MILLER,
Anderson, Indiana.
1894 U. S. A.

IMPROVED AIR-COOLED FLANGES

We Make STEEL WHEELS

To Fit Any Axle Plain or Grooved Tire

Steel or Hickory Axles

Any Size A Full Line of Wood and Steel Farm Trucks

With Steel or Wood Wheels Write for Large Catalog and Prices



Our Grooved Tire

ELECTRIC WHEEL CO.
Box A, Quincy, Ill.

HAVANA STEEL WHEELS

For your Farm Wagon, so as to make it a Low-Down, instead of having to do your work over the sides of a high wheeled wagon. No dry, loose wheels. More and easier work done.

Send postal for free catalog of Steel Wheels and Farm Trucks.

HAVANA METAL WHEEL CO.,
Box 85 Havana, Ill.



"GEARS AND WAGONS"

Selle Gears

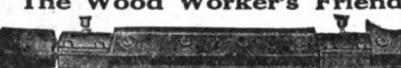
A quarter of a century of success has placed "Selle Gears" and Wagons in the hands of the largest wagon users in the world.

Express and Transfer Companies, Department Stores, Fire Departments, etc.; specify "Selle Gears" and will take no other after once tried.

230 page catalog free

THE AKRON-SELLE CO. Akron, Ohio

The Wood Worker's Friend



Get directions for building table and operating our Jointer's. This information is valuable to wood workers. We manufacture 20 styles and sizes. Try a Jointer Head 30 Days, if you are not pleased, return at our expense. Get prices.

Mfg. by WHISLER MFG. CO., Gibson, Iowa

Shipped on Approval

Write at once for particulars of shipments and my 48-page catalog. Agents wanted to drive and demonstrate the Bush Five-Pass, 34.7 H. P., 132x3 1/2 tires



Car. Opportunity to pay for it out of your commissions. Agents making money. Shipments are prompt. Bush cars guaranteed or money back. 1918 models ready. Add. J. H. Bush, Pres. Dept. K-2 Chicago, Illinois

216-in Wheelbase
Delco Ignition—Elect. Stg. & Ltg.
BUSH MOTOR COMPANY, Bush Temple, Chicago, Illinois

THE IMPROVED EASY HOOF TRIMMER



Will cut a hoof easier, quicker and better than any tool you have ever had. Weight 21-2 pounds, opening 2 inches, cuts one inch. Thousands of shoers are using the EASY HOOF TRIMMER with great satisfaction.

SEND \$1.50 TODAY

Delivered to any part of the U. S. by Parcel Post.

MUNCIE WHEEL CO., Muncie, Ind., U.S.A.

BALL AND ROLLER BEARINGS

The Bowden Patent Wire Mechanism

for the Transmission of Reciprocating Motion through a Flexible and Tortuous Route.

THE GWILLIAM COMPANY

Engineers
Mechanical Specialties

253 W. 58th St. (at Broadway), NEW YORK

ACCESSORIES AND SUPPLIES OF INTEREST TO THE TRADE.

Continued from Page 38.

The price of this work is \$10 and a supplement has been issued that sells at \$2.50 which gives buyers of last year's guide the opportunity of bringing this information to date.

As a whole the new Automotive Wiring Manual is by far the most valuable aid in running down trouble that has ever been



offered to the automobile world. Each diagram has been made under the supervision of competent engineers and has been checked and re-checked so that everything contained within its covers is absolutely right.

The Automotive Wiring Manual is published by the Automotive Publishing Co., 5 North Wabash Ave., Chicago, Illinois, from whom additional information can be obtained on request—send for it.

"20TH CENTURY", RUBBER BACK PATCH OUTFIT

The "20th Century", two-ply construction, Rubber Back Patches makes a satisfactory and permanent repair on the smallest puncture or the largest blow-out. A ply of raw Red Face Stock next to the tube gives a smooth quick job of vulcanizing, and the back side of Patch is of black cured rubber, which makes the Patch absolutely leak-proof and as durable as the tube itself. Outfit consists of 1 sheet patching material, tube of cement, and sand paper. No heat or tools required.

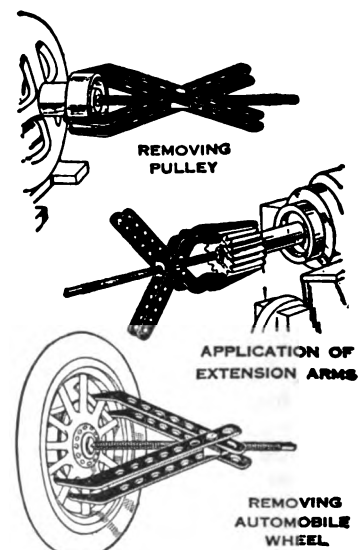


Manufactured by 20th Century Tire Protector Co., Midlothian, Texas.

This Patch made in two sizes, 2 1/4 x 16 size 50c, 4x20 size \$1.00. Patches any size desired can be cut from these sheets.

A TIME SAVING TOOL.

The "Little Giant" Gear and Wheel Puller, which we illustrate herewith has a great many uses and is one of the best tools for this purpose that has ever been brought to our attention, so we in turn want all our readers to know about this new device.



The "Little Giant" is a well made tool and is very light and strong, there is nothing but drop forgings and tool steel used in its entire make-up. Due to its designs, it has a great range of uses, some of which, you will note from the illustration, are uses that you are liable to have any day in your own shop. The construction enables the "Little Giant" to be readily adjusted for work from 2 1/4" diameter up to 13" and if the extension arms are used, it's range is from nothing up to 13" and you will also note by its peculiar design that the harder the pull for the "Little Giant", the tighter it grips, while on all gear pullers heretofore on the market, this was not so, but on the contrary when you had a strong pull to make, it was

Continued on Page 42.

ONE KICK MIGHT COST

a hundred dollar doctor bill and keep you out of the shop for months—in fact nearly ruin your business. Why take the chance? Make sure such a disaster can't happen to you by simply using

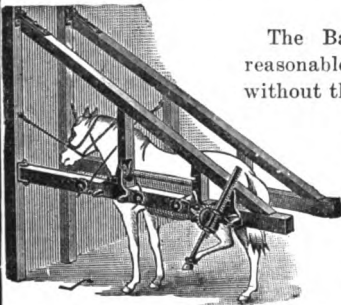
Barcus Safety Horse Stocks

Entirely different from the old style horse stocks with their bothersome ropes, straps and buckles. All chances for injury are removed by the Safety Foot Clamp—a fortunately discovered automatic device that holds the foot like a vise. Its action is positive, quick and safe—you do not even have to touch the foot or limb of the horse.



The Barcus sells at a price so reasonable no smith can afford to be without the protection of these stocks.

As you value your life and health, as you seek to protect and support your family, do them and yourself the justice of writing for complete information without delay.

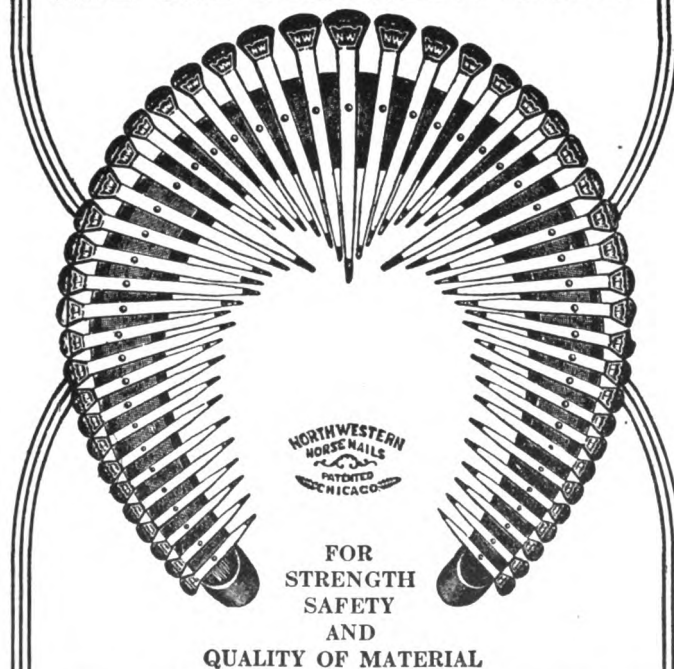


The Barcus Mfg. Co.,

Wabash,

Indiana.

NW Northwestern Horse Nails ARE THE BEST ALL AROUND



NORTHWESTERN
HORSE NAILS
PATENTED
CHICAGO

FOR
STRENGTH
SAFETY
AND
QUALITY OF MATERIAL

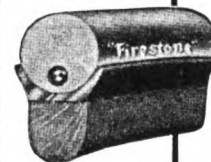
The most perfect in form and finish. Made of the highest grade material to our own analysis. Will hold a shoe longer than any other nail made. Note the re-enforced point—makes it easiest to drive and the safest to use.

Union Horse Nail Co.

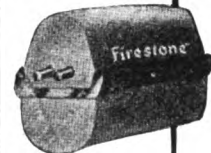
Chicago, Ill.



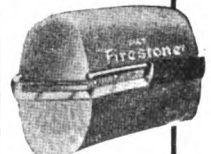
Massive in Appearance Light in Weight



Cushion



Internal Wire



Side Wire

IT is the generous measure of rubber that gives Firestone Carriage Tires the width and thickness which add so much to the appearance of the "turnout."

It is the quality of the rubber that allows extra size and resiliency without extra weight.

Firestone Carriage Tires give thorough satisfaction in comfort, wear and appearance, so uniform that they wear evenly to the channels.

Firestone Dealers win new buyers who become regular customers. Write for attractive proposition to dealers.

FIRESTONE TIRE & RUBBER CO.
Akron, Ohio, Branches and Dealers Everywhere

Firestone Carriage Tires

Don't Send a Penny

These Len-Mort Work and Outdoor Shoes are such wonderful value that we will gladly send them to you prepaid, no money down. You will find them so well made and so stylish and such a big money saving bargain that you will surely keep them. No need to pay higher prices when you can buy direct from us. Why pay \$5 and \$6 for shoes not near so good?

Great Shoe Offer

This shoe is built to meet the demand of an outdoor city worker's shoe as well as for the modern farmer. Built on stylish lace Bluecher last. Special tanning process makes the leather proof against the acid in milk, manure, soil, gasoline, etc. Made by a special process which leaves all the "life" in the leather and gives it wonderful wear-resisting quality.



Very flexible, soft and easy on the feet. They outwear three ordinary pairs of shoes. Double leather soles and heels. Dirt and water-proof tongue. Heavy chrome leather tops. Just slip them on and see if they are not the most comfortable, easiest shoes you ever wore.

Pay **\$3.85** on arrival. If after careful examination you don't find them all you expect, send them back and we will return your money. **SEND** your name and address, and be sure to state size you want. Send no money. Price only \$3.85 on arrival. We send these splendid shoes **PREPAID**. You are to be the judge of quality, style and value. Keep them only if satisfactory in every way. Be sure to give size wanted. Send now.

LEONARD-MORTON & CO., Dept. 1207 CHICAGO

TIRES & TUBES

SLIGHTLY USED AND FACTORY REPAIRED
TIRES AND TUBES—QUALITY ABOVE ALL

The **QUALITY** of our tires and tubes is superlative, the **PRICE** cannot be equaled and our **SERVICE** cannot be excelled.

A satisfied customer is our biggest asset, therefore we must satisfy you.

Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$ 4.00	\$1.35	35x4.....	\$ 8.00	\$1.75
30x3½.....	5.00	1.45	36x4.....	8.00	1.75
31x3½.....	5.25	1.50	34x4½.....	8.25	1.75
32x3½.....	5.50	1.50	35x4½.....	8.50	1.80
34x3½.....	6.00	1.60	36x4½.....	8.75	1.85
31x4.....	6.25	1.65	37x4½.....	9.25	1.90
32x4.....	7.00	1.60	35x5.....	9.50	2.00
33x4.....	7.75	1.70	36x5.....	9.50	2.00
34x4.....	7.75	1.70	37x5.....	10.00	2.20

Send \$1.00 deposit with each tire ordered. Tires will be sent promptly C. O. D., with privilege of examination. Specify style of rim to avoid delay.

Our slightly used tires bear no mileage guarantee; but in the event that they do not give service in proportion to the price, you may return them to us by prepaid express and we will cheerfully make fair adjustment.

We also carry a complete stock of new tires

LINCOLN TIRE & SUPPLY CO.

1463 S. Michigan Ave. Dept. D. Chicago, Illinois

ACCESSORIES AND SUPPLIES OF INTEREST TO THE TRADE.

Continued from Page 40.

very likely that the arms would slip off the work just about the time you were getting your strongest pull and you can readily see that this cannot happen with the "Little Giant."

You will also not that the "Little Giant" has four puller arms or prongs and on this account it will not twist off the work when a job is being pulled. Every puller is tested to stand a three ton pull before it leaves the factory, although on tests the "Little Giant" has stood a twenty ton pull before breaking which is more than anyone will ever experience in ordinary repair shop work.

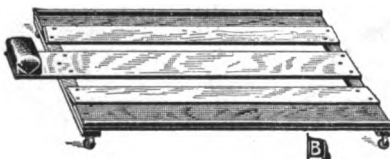
Every machine and repair shop ought to have a "Little Giant" as part of their equipment, for it would pay for itself on time saved on the first job, and if you would like to get one, make inquiry of your jobber and if he cannot furnish make your inquiry or place your order direct with the Premier Electric Company 4052 Ravenswood Avenue, Chicago, Illinois and they will be glad to serve you directly, but most all leading jobbers throughout the country are handling the "Little Giant."

The price of the "Little Giant" without extension arms is \$10.00 and complete with extension arms \$11.00 with a very liberal discount to dealers.

BANNER AUTO CREEPER

Some folks believe in making work just about as hard as it can be made. But the wise ones take advantage of every little convenience that is going to make their labors easier and give them as much pleasure as possible on the job.

A mighty convenient little device that fills the bill to perfection in making the lot of the auto-repairman easier is the handy little wood auto creeper made by the Banner Accessory Mfg. Co., of St. Louis, Mo. and sold at only \$2 through the regular trade jobbing houses.



This creeper is distinctive in being made of wood which gives enough to fit the shape and position of the back comfortable. At the same time it is strong enough to withstand hard usage in the shop. And an added feature is its lightness—weighs but 8 lbs.

Ball-bearing casters are provided which permit easy getting around and turning in any direction while under the car. These are locked-in and will not fall out.

We really believe this creeper is an exceptional value at the price and recommend it heartily to our readers.

GEO. D. BAILEY CO. BUILD NEW FACTORY.

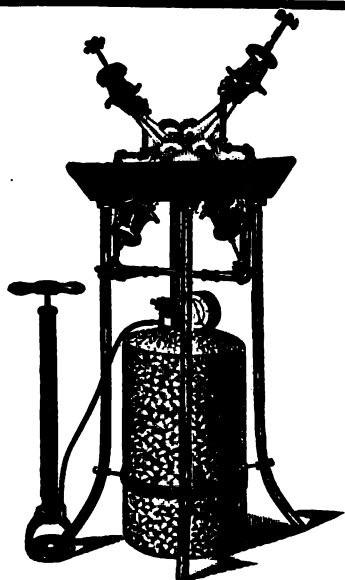
A little over a year ago The Geo. D. Bailey Co. was organized for the purpose of marketing the Bailey Ball Thrust bearing for Fords and Chevrolet 490 cars. This ball bearing was to replace the flat thrust washers that take the gear thrust at the left side of the differential and which, because of their flat surface, produce friction and wear thin causing gears to unmesh.

The company after having perfected their ball thrust bearing which, containing steel balls, was frictionless, and thereby permitted no wear, proceeded to market it through the regular dealer channels in a conservative manner feeling that the market was present for such a bearing. A greater demand soon made itself evident and that there was a popular demand for a bearing of this type is evidenced by the fact that in just one year's time the Bailey Company has been forced to move from their previously small quarters and build their own modern factory.

The new plant, located at 4500-4506 Ravenswood Ave., Chicago, is equipped with \$75,000 worth of the latest type of machinery for manufacturing not only the Bailey Ball Thrust but their new product, the R C Magneto Coupling for trucks, tractors and passenger cars, and is so arranged as to enable the company to turn out its products economically on the highest efficiency basis as well as placing it in a position to manufacture other products the company has in mind.

Not a little of the success of the rapid growth of the Bailey Co. can be attributed to Mr. C. F. Ferguson, Vice-President and General Manager, whose intimate knowledge of merchandising methods has enabled him to inaugurate as a selling policy for the Bailey Ball Thrust one that has proved to date a most satisfactory one to dealers and jobbers throughout the United States and Canada. Judicious advertising also has played large part in the success of this manufacture.

Continued on Page 44.

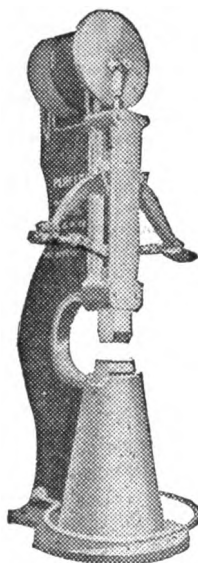


Best Gasoline Brazing Forge IN THE WORLD

Thousands sold in last ten years. Four sizes. Send for catalog.

The National Rubber & Specialties Co.
4433-39 Chickering Ave., Winton Place,
Cincinnati, Ohio.

The Perfect Power Hammer



The Simplest
in Construction
The Most
Effective in
Operation
The Most
Durable and
THE BEST

MADE IN TWO
SIZES:

3 inch square, 40 lb.
ram — shipping
weight, 1,100 lbs.

4 inch square, 80 lb.
ram — shipping
weight, 1,800 lbs.

Write any jobber
for Prices, or

**MACGOWAN & FINIGAN
FOUNDRY & MACHINE CO.**
204 North Third Street
ST. LOUIS, MO.

Beals

**McCarthy
& Rogers**

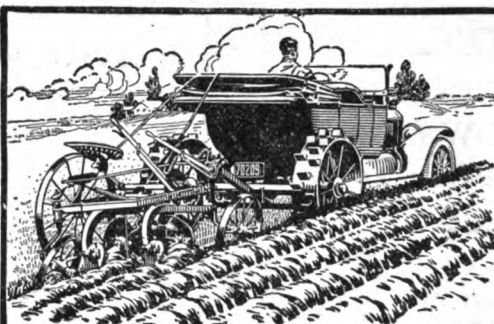
Formerly Beals & Company

**Blacksmiths and Wagon-
makers Supplies**

Motor Car Accessories

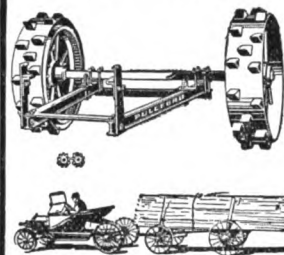
Buffalo, N. Y.

Largest Stock in New York State



Plow and Pull
With **FORD** All That 4
Your **Horses Can**
Pullford \$155 F. O. B.
Quincy, Ill.

MAKES a practical tractor
out of a Ford or most any
other car. Easily attached to or
removed from the car in thirty
minutes. No holes to drill, no
springs to remove. **Practical,
Durable, Reliable.**



New FAN DEVICE Prevents Heating Hundreds WORKING NOW for Satisfied and Enthusiastic Owners

Pulls plows, harrows, drills, mowers, binders, hay loaders,
road graders, wagons, trucks, etc. Steel wheels with roller
bearings and tires 10 inches wide, two pairs of hardened
Vanadium steel pinions, one for plowing and one for haul-
ing speed. A tractor with the reliability and durability of
the Ford car. Prompt shipment. Write for catalog.

It was the Pullford attached to Ford cars pulling two 12-inch plows
running on Kerosene, equipped with new fan device, that made a most
successful demonstration at Fremont, Nebraska.

PULLFORD COMPANY, Box 319C
Walton Heights, QUINCY, ILLINOIS
Telephone No. 84

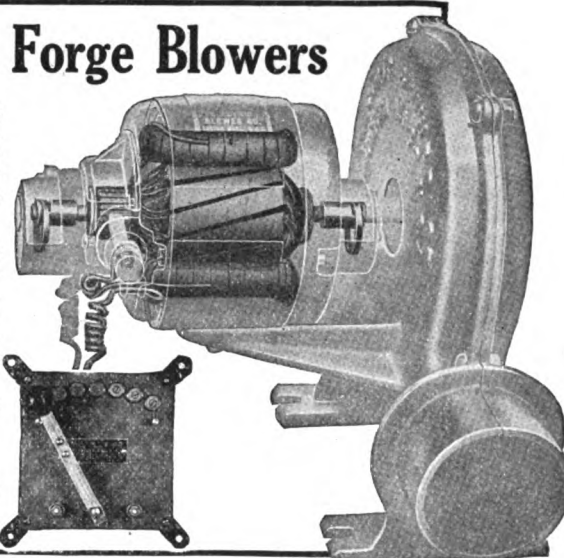
"MARVEL" Forge Blowers

This cut shows you the
RING OIL BEARING design
and construction of the mo-
tors used in our "ONE
FIRE" \$35.00 MARVEL Blow-
ers.

Note the large oil rings
which revolve with the
CASE HARDENED shaft,
keeping it running in a per-
fect bath of oil on the bear-
ings. Perfect Lubrication
means long life.

Shipped on 30 days trial
through your dealer.

Electric Blower Co.
Boston, Mass.



ED. H. WITTE

I WILL SELL YOU AN ENGINE

On Practically Your Own Terms

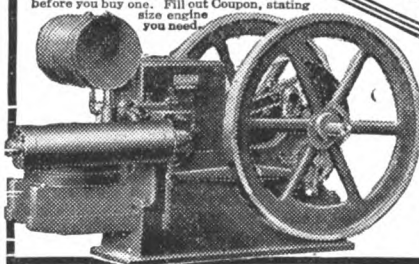
**ALL CASH,
PART CASH,
or NO CASH
DOWN**

Any worthy, creditable person, anywhere
in the U. S. can buy on these terms. Any-
one can order without risk. I guarantee
safe delivery to your station. All WITTE
Engines sold on 5-year guarantee.

My factory is the largest exclusive engine factory in
the world, selling direct to the user. You get your
engine quick—no delay in shipping. **Can Ship Your
Engine Quick.** You choose engine and plan of
payment. WITTE Engines are best-looking, best
balanced, easy to operate. **Money Back
If Not Satisfied on My New 90
Day Engine Offer—FREE.**

—ED. H. WITTE, Pres.

WITTE ENGINE WORKS
1765 Oakland Avenue
Kansas City, Mo.
1765 Empire Bldg.,
Pittsburgh, Pa.



**SIGN
HERE
FOR FREE BOOK**

Name _____
Town _____
State _____

Mail to Witte Engine Works

STAR STEEL SHAPES
THE STANDARD
PLOW REPAIRS
FOR 30 YEARS



SOFT CENTER
SOLID CAST AND
CRUCIBLE STEELS



The "STAR" guarantees the Quality
STAR MANUFACTURING COMPANY
CARPENTERSVILLE, ILL.

280 Shoe Styles for \$1.00

Prof. Rich's Book "Artistic Horseshoeing" contains photographic illustrations of over 280 styles of shoes, and over 200 pages of practical matter on: Anatomy, The Hoof, Curing Lameness, the Bar Shoe, Diseases and Accidents, Formulas, Receipts, etc., etc. The illustrations are fully explained.

Our inventory shows an overstock in the Book Department. These books are all perfect, clean and undamaged. The small lot will go quickly at this price.

Order now and get a \$2.00 Book for \$1.00.

American Blacksmith Company,
New Sidway Building, Buffalo, N. Y.

ACCESSORIES AND SUPPLIES OF INTEREST TO THE TRADE.

Continued from Page 42.

THE GENEVA TRACTOR.

An acute labor shortage and a greater need for production than ever before in history has forced farmers everywhere to consider the purchase of tractors. But the majority of farmers have but a hundred or two acres; hence they cannot profitably use a big tractor. What they need is something to take the place of three or four horses, that will not require a heavy initial investment or great operating expense and will be adaptable to a large variety of uses.

The Geneva Adapto-Tractor is ideal for this purpose. It consists simply of an attachment which makes of any Ford car an efficient, reliable and low cost tractor. It does not in any way spoil the Ford's usefulness as a passenger car. The farmer can do his plowing during part of the day with a Geneva and after spending 20 minutes in changing the Adapto-Tractor for the regular Ford rear Wheels, drive to market or elsewhere.

The Geneva Adapto-Tractor possesses many distinctive features in common with no other device of this character. Its short wheelbase permits turning practically within its own length. Overhanging lugs give traction where the average machine stalls. Wheel segments are removable in case of breakage and can be replaced for 50 cents. Draw bar is attached to special axle; no strain on car. Special step furnished so running board does not have to be out. Kerosene carburetor can be furnished if desired. Cooling system amplified by special fan which drives more air through radiator at 2½ miles per hour, when used as a tractor, than obtained by regular Ford fan at 25 miles per hour.

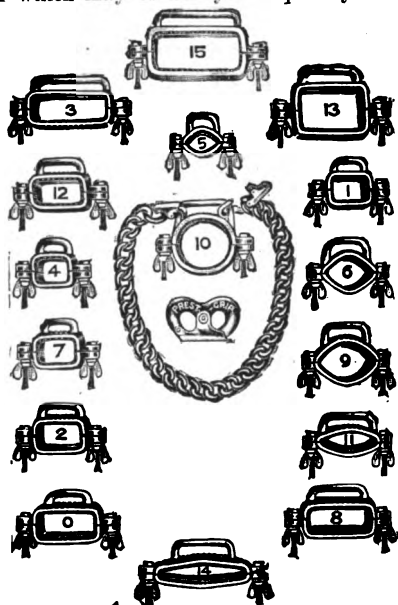
The manufacturers will gladly send circulars and full details of their agency proposition on application. Address the Geneva Tractor Company, Geneva, Ohio.

ROWE CALK & CHAIN CO.

Readers of the American Blacksmith, Auto & Tractor Shop have long been familiar with the Rowe Calk Co. as manufacturers of the well-known horseshoe calks which bear their name. With the advent of the motor truck, they have logically developed a "calk" for the "feet" of the motor horse. In other words, anti-skid tire chains. A review of their success with the Rowe Calk points out a similar success with the "PREST-O-GRIP" Tire Chain; for in designing the latter, they have observed the same fine points regarding sim-

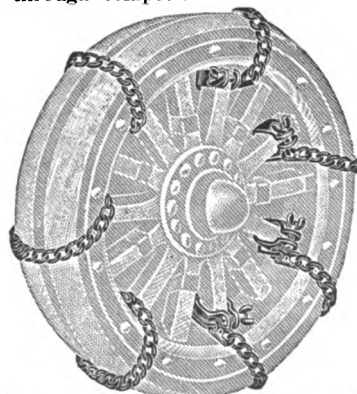
licity, ease of putting on, economy, etc.

Its outstanding feature is convenience. No long pieces of chain to unravel or take up or become useless through a few strands wearing out. Rowe Chains are made in short detached sections, each one of which may be easily and quickly hook-



ed on. In case one breaks, it is easy to detach and drive on with no further trouble. A big advantage claimed is that the truck does not have to be moved forward in order to attach.

It goes without saying that materials and workmanship are of the best. Perhaps that is best exemplified in the fact that the United States Government, in selecting through competitive tests for use on



army trucks, chose Prest-o-Grips. They are now on use on U. S. Trucks of the

following make: Garford, Selden, Packard, Pierce-Arrow, White, Riker, Nash Quad, and Four Wheel Drive. Also, many of the largest commercial users of motor trucks use them as standard equipment: Standard Oil Companies, Bell Telephone, Wells Fargo, National Cash Register Co., New York City Fire Dept., and others.

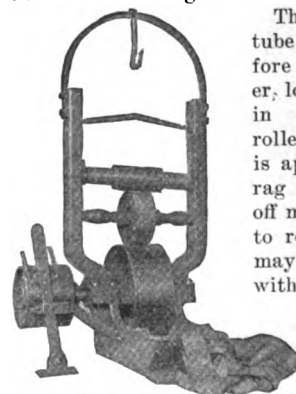
Readers will find this an accessory well worth looking into. Winter will be here almost before one realizes it, and as deliveries are anything but certain in the steel line, it would be well to investigate early.

"W. J. (Bill) Slater has resigned as Pneumatic Tire Sales Manager of The Firestone Tire and Rubber Company to become General Sales Manager of The Williams Foundry and Machine Company Akron, Ohio, the largest makers of tire building and repairing equipment in the world.

Mr. Slater's connection with the Firestone Company covers a period of several years during which time he was successively manager of advertising, sales promotion, and pneumatic tire sales.

AKRON-WILLIAMS RAG ROLLER

The new time-saving device meets the demand from tire factories and large repair shops for greater accuracy and speed in unwinding the wrapping around inner tubes after curing.



The mandrel and tube are placed before the Rag Roller, loose end of rag in contact with roller, then power is applied and the rag quickly rolled off mandrel and on to roller. The rag may be removed with ease, after lifting small rod up to hook at the top.

This new Akron-Williams Rag Roller takes up very little space, and may be installed on a bench or at any convenient place near the machine for wrapping tubes.

The price is much less than old style Rag Rollers and it is being adapted by many shops in recognition of its time and money-saving efficiency.

Made by The Williams Foundry & Machine Co. Akron, Ohio.

Extract from page 324 of the June, 1917, issue of *The Horseshoers' Journal*

Horseshoeing business in Albany opened very quietly this spring. In fact, we still feel the harmful effect that the drive calks has done the business, but strikes in the building line has also effected trade, a large number of horses owned by contractors are remaining unshod, and are still carrying (to May 10th) their winter shoes of drive calk variety.

CHARL W. KIRK.

**ARE YOU
IN THIS BOAT ?**

**John Wiseman says to Bill
from Missouri:**

"It's time for a lot of you fellows to wake up. Ram your hand down into your pocket and see if the cash jingles with the merry sound as of yore."

"If not, why not?"

"There's a Reason, of course. And that reason is that you've been using calks that the owner can replace himself. Naturally his horses come less frequently to your shop. You have less business—less cash to jingle in your jeans."

"Do you get the idea?"

Every set of welded calks you put on helps to keep your shop full because the horses must be brought to you to have the worn calks replaced. And the users are satisfied users too.

SWEET'S
CENTER NIB BLUNT

Use SWEET'S TOE
CALKS—"The
Cold Cut
Dreadnaught"
(No. 2)

FRANKLIN STEEL WORKS

Joliet, Ill. Cambridge, Mass. Hamilton, Ontario

An Object Lesson

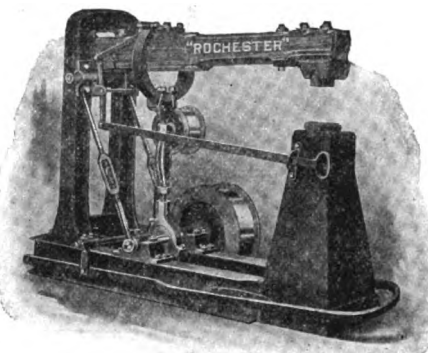
Money-Earning Machines

FILL THE CASH BOX

**The Rochester
Helve Hammer**

Saves Energy; Does quicker and more Satisfactory Work, pays for itself and adds to your Bank Balance.

SEE LEFT-HAND MARGIN NOTE



THE "ROCHESTER" HELVE HAMMER

SEE OUR CATALOG FIRST,—THAT'S THE IDEA

HELVE HAMMERS—TIRE SETTERS—SHELL BANDING MACHINES

The WEST TIRE SETTER CO.

ROCHESTER, NEW YORK

Norton Wheels in the Blacksmith Shop

The wheel for the blacksmith shop must be adapted to a great variety of work in order to be economical.

The wheels usually recommended for general use in blacksmith shops are 24 P and 24 Q ALUNDUM, sometimes, however, a 30 P or Q is used to better advantage.

If a fair finish is desired, good results may be obtained with a 36 O ALUNDUM, but if the finish is to be fine, wheels 46 N or O are commonly used.

Wherever the speeds are low, a harder wheel will be found more satisfactory, but if possible, the wheels should be operated at 5000 to 6000 surface feet per minute.

**Norton Company
Worcester, Mass.**

NEW YORK STORE
151 CHAMBERS STREET

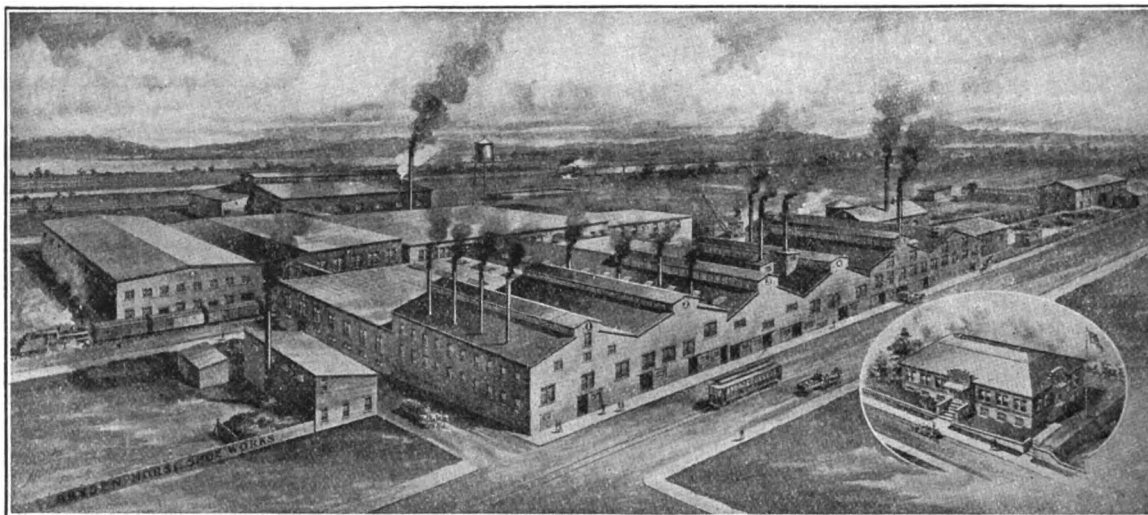
CHICAGO STORE
11 N. JEFFERSON STREET

ELECTRIC FURNACE PLANTS
NIAGARA FALLS, N. Y. CHIPPEWA, ONT., CANADA



THE VETERAN HORSESHOER LOOKS BACK UPON **35 YEARS**
OF COMPLETE SATISFACTION WITH THE
BOSS IRON & BANNER STEEL
HORSE AND MULE SHOES

and we strive NOW to maintain that standard of quality which marked so plainly the "BOSS" shoe in 1882.



Bryden Horse Shoe Works
Catasaqua, Penna.

SEND FOR DESCRIPTIVE CATALOG.

MILTRENA SMITHING COAL

We are in position to accept orders from Consumers, Jobbers and Retailers for our *Miltrena Blacksmithing Coal*, the *Standard of the World*, when assured that it will be used in good faith for blacksmithing purposes only.

SMOKELESS FUEL COMPANY,

Kanawha Banking & Trust Bldg.,

CHARLESTON, W. VA.

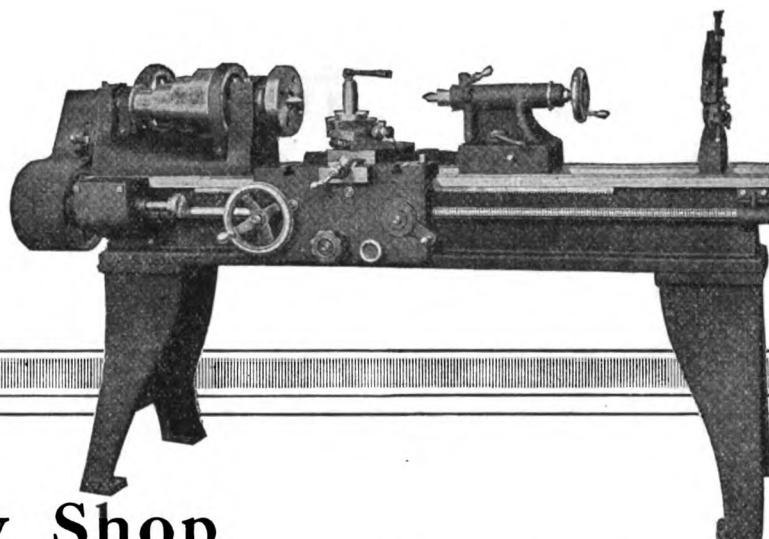
Pioneer Shaft Ends

If you have never learned by actual experience just how good are, do it now by ordering a few of your jobber, and don't let him pawn off on you the "just-as-good," "may suit" brand. Look for the Pioneer trade-mark on the wrappers. Possibly you order a certain kind of horse nails and shoes because they are better and please. So why not specify **Pioneer Shaft Ends** for the same reason? Once you get acquainted, they will be your affinity ever afterwards.

Pioneer Shaft Ends are the kind that are easy to fit, and make the strongest joint.

THREE SIZES:—BUGGY, SURREY AND LIGHT BUGGY.

Made by **CRANDAL, STONE & COMPANY, BINGHAMTON, N. Y.**



Every Shop Needs This CANEDY-OTTO LATHE

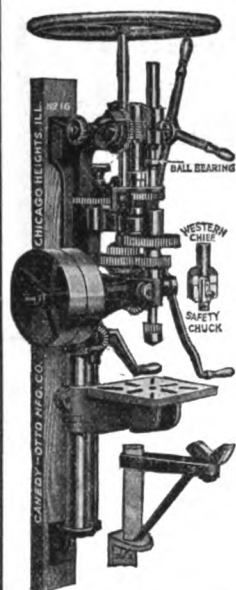
Made by the same firm who for over 25 years have manufactured shop tools—noted for high quality and unexcelled workmanship.

Canedy-Otto 14", 16" and 18" screw cutting engine lathes are built for service. *Spindle* is made of 50 point Carbon Steel accurately ground runs in the best quality bronze bearings. *The Apron* is made for heavy duty. *Gear Box*—quick change type. *Complete Equipment* is furnished.

We make over 200 different styles and types of tools—to fill every requirement of blacksmiths, auto repair shops, machine shops, foundries and garages.

Most jobbers handle the **Canedy-Otto** line. If yours does not—write us and we will see that you are supplied.

Catalogue No. 12 gladly sent on Request.

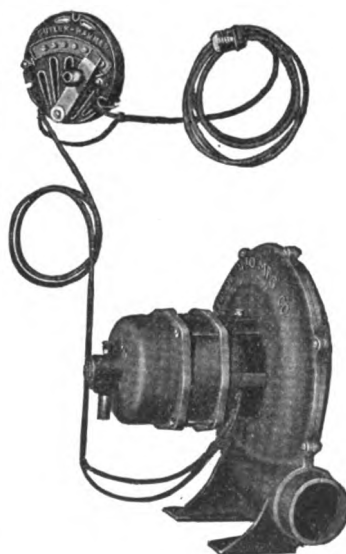


No. 16 Drill

The largest post drill made; drills from 0 to 1½ in. holes. Has automatic self-feed and all the features of a high-grade machine shop floor drill.

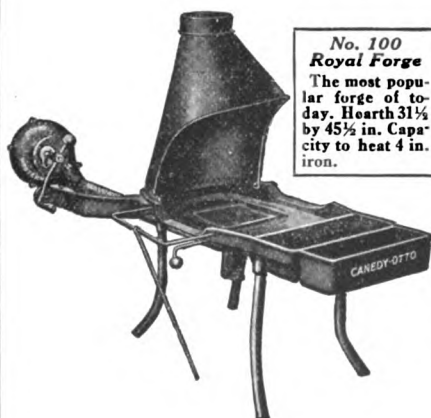
No. 8 One Fire Electric Blower

Guaranteed to be superior to any blower on the market. Built for service.



No. 100 Royal Forge

The most popular forge of today. Hearth 31½ by 45½ in. Capacity to heat 4 in. iron.



No. 3 Grinder

A well-machined and highly-finished grinder, made in four different sizes. Will take from smallest up to 20 in. wheels. Furnished with or without column.

No. 36 Drill

A 20 in. upright floor drill, equipped with back-gears, self-feed and automatic stop, very accurate and rapid in operating. Drills from 0 to 1½ in. holes.



CANEDY-OTTO MFG. CO.,
CHICAGO HEIGHTS, ILL., U. S. A.

J O B W A N T E D !



An able bodied workman seeks a position in some good blacksmith or machine shop. He is an old acquaintance and friend of the Editor of the American Blacksmith, to whom he is permitted to refer.

He is not particular as to what locality he works in, provided he has plenty of good hard work to do, and his employer is honest and careful.

With such a boss, he agrees never to touch intoxicants or indulge in other dissipation. He agrees to be on hand ready for work at seven o'clock in the morning, or any earlier hour the shop opens. He will work overtime without grumbling, even to twenty-four hours daily for as long a period as may be necessary.

He will agree never to strike, ask for higher wages, or even want to go fishing or take a holiday.

He will board himself and remain in perfect health indefinitely. He has no family cares to worry about. He and his brothers, older and younger, are of the well known L. G. P. HAMMER clan, world renowned for skill, integrity and ability.

He is willing to work for twenty cents a day and agrees to do more work than any six skilled men at \$3.00 per day. After his wages have been paid for twenty months, he agrees to work for nothing during the remainder of his natural life, which he estimates at fifty years.

He agrees to come on trial and after thirty days work, if his boss is not satisfied he will return home without any charge for his services.

He guarantees that he will relieve his employer from all drudgery, so he can spend more time with his family, and not be so eternally tired that he can get no enjoyment out of life.

He will treat all customers so pleasantly and do their work so skillfully that they will always bring their work to his shop, and advise their friends to do likewise.

He is not subject to enlistment or draft, and is ready to leave at once and begin work immediately on arrival.

Address: **LITTLE GIANT**, 101 Rock St., Mankato, Minn., U.S.A.



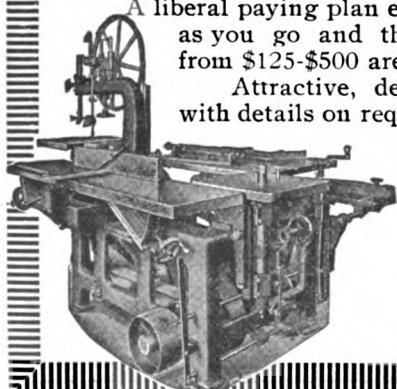
Affiliate With The "FAMOUS" and you will be running for the right party— PROFITS

In this time of expense, Liberty bonds and War stamps, more money has a welcome sound.

Partner with a Famous Wood-working machine enables you to perform from 5 to 24 of such operations as rim-boring, sanding, beveling, babbitt-ing, etc., where with old methods you have had to purchase many smaller machines.

A liberal paying plan enables you to buy as you go and the prices ranging from \$125-\$500 are reasonable.

Attractive, descriptive catalogs with details on request.



**SIDNEY
TOOL
COMPANY**

Dept. 14,
Sidney, O., U. S. A.

PARK'S WAGON SHOP SPECIAL CIRCULAR RIP and CROSS-CUT SAW

22" Bandsaw, 6" Jointer

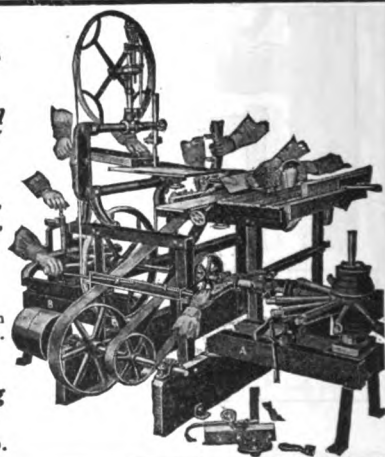
Tilting Guide, Rim Rounder,
Felloe Borer, Spoke Tenoner,
All Ready for Instant
Use

No Changing

Made in two sizes. Will be sent on
trial anywhere in U. S. or Canada.
Write for catalog today.
Don't put it off.

**Park's Ball Bearing
Machine Company**

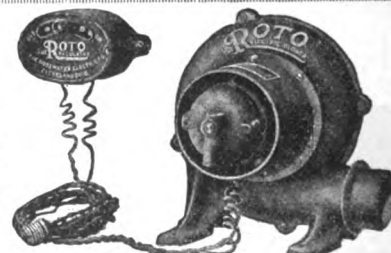
4100 Fergus Cincinnati, O.



ROTO
The ELECTRIC BLOWER

only \$30.00

An electric blower
that guarantees
absolute satisfac-
tion.



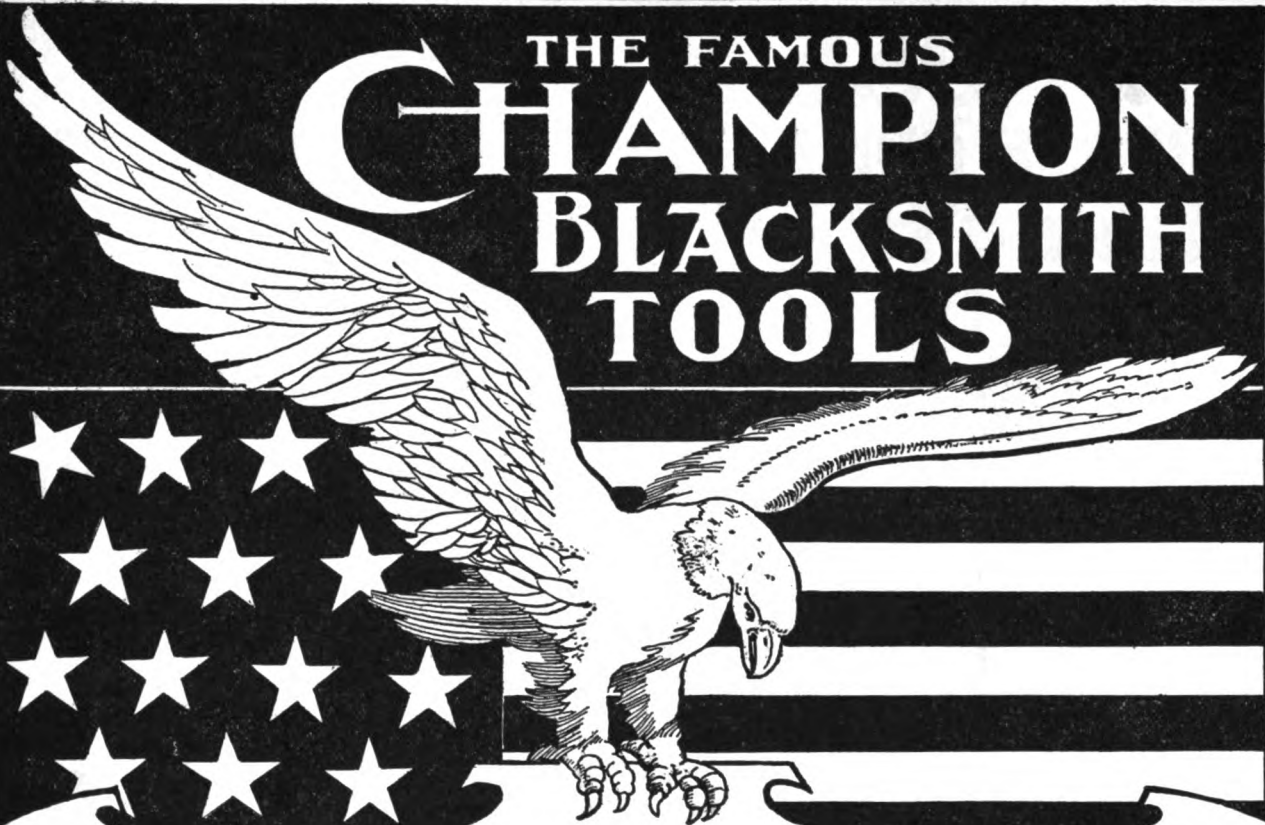
Will save you time now wasted blowing your forge by hand. With the ROTO you can do twice the work in less time—better, cheaper and quicker—and dependable at all times. Used by the United States Navy.

BUY DIRECT FROM US AND ELIMINATE THE MIDDLEMAN'S PROFIT! Write NOW for free trial offer.

The Rosewater Electric Company

5516 Kinsman Road, Cleveland, Ohio

THE FAMOUS CHAMPION BLACKSMITH TOOLS



Hercules Patented Power Hammer. Weight of ram. 65 pounds.



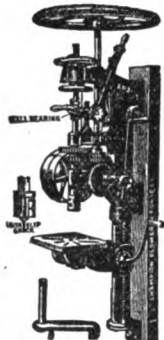
No. 408. Steel Blacksmith's Forge.



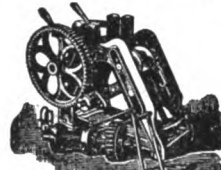
No. 400. Crank turns either way.



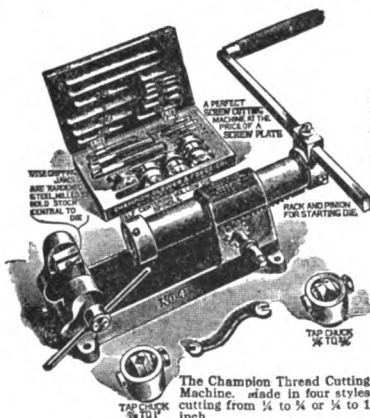
No. 433. Cast Iron Blacksmith's Forge.



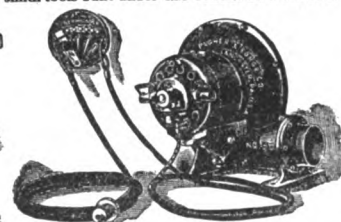
No. 203. Self-Feed and Double Compound Lever Feed Drill.



The Champion "Columbian" Tire Bender. Made in 3 sizes.



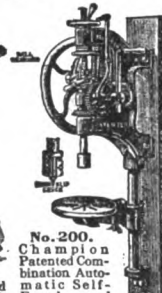
The Champion Thread Cutting Machine. made in four styles cutting from 1/4 to 1 inch.



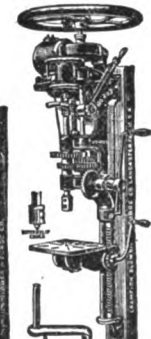
No. 50. Champion One-Fire Variable Speed Electric Blacksmith Blower.



No. 4. American Tire and Axle Shrinker. Will shrink up to 4x1 inch round edge-tire, and axle up to 1 1/4 inch.



No. 200. Champion Patented Combination Automatic Self-Feed and Double Compound Lever Feed Upright Post Drill.



No. 203. Self-Feed and Double Compound Lever Feed, Electrically Driven Post Drill.

Don't Fail to Get 1918 Catalog
Before purchasing a Hand Blower, Forge, Drill Press, Tire Bender, Tire Shrinker, Screw Plate, Power and Electric Blower, Hammer, Punch, or Shears, write for our free catalog, which always shows the greatest variety of improved Blacksmith tools built under one control in the world.

CHAMPION BLOWER AND FORGE CO - LANCASTER PA - U.S.A.
SOLE AGENTS FOR GREAT BRITAIN AND IRELAND FARMER & CO - CLERKENWELL LONDON

The ROSE GREASE GUNS Make a HIT Every Time



First in War
Used by the U.S. Army and Navy
First in Peace
Backed by an Army of Satisfied Users

Distributed by most Jobbers and Dealers, if your Jobber does not have the Rose Grease Guns write us for samples which will sent all charges prepaid at the regular Dealers prices. Please mention your nearest Jobbers when writing.

Made in Three Sizes

The Rose Auto Gun for the Individual Car Owner, Price \$1.80
The Rose Universal Gun for the Car, Truck and Tractor, Price \$2.50
The Rose Shop Gun for the Garage and Repair Shop, Price \$3.50

J. H. HANEY & CO., Manufacturers, Hastings, Nebr.

Rose Tire Pumps and Rose Grease Guns

Wexford Motor Cloths

CHASE

are noted for their long wearing qualities, their adaptability to all conditions and the ease with which they can be put on as a new top.

Wexford Cloth is woven of pure mohair combined with an absolutely waterproof fabric that is impervious to rain, snow and heavy dampness, and no ordinary folding will wear it out. This is a splendid proposition for you to take up. Write for samples and further particulars.

L. C. Chase & Company,

Boston, Mass.

TURN THAT STREAM OF PROFITS INTO YOUR SHOP

Why longer let the good money in oxy-acetylene welding pass on to another shop? It is ready to stop at your door if you do the work. And all you need do to capture these good extra profits and make a welding reputation for your shop is to put in this

IDEAL WELDER

Then you are ready to tackle the largest or smallest welding jobs with complete success. And you do not have to make a large investment—the IDEAL outfit is low priced enough to pay for itself in an unusually short time.

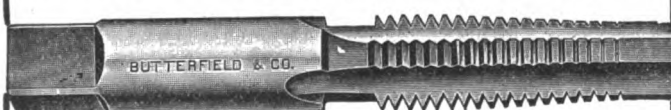
You will be well repaid if you write immediately for complete information regarding the IDEAL outfit.

GENERAL WELDING CO.

394 14th Street, Hoboken, N. J.



Butterfield's Screw Plates



We do not claim to be the oldest manufacturers of Screw Plates. We are not sure that this is any distinction.

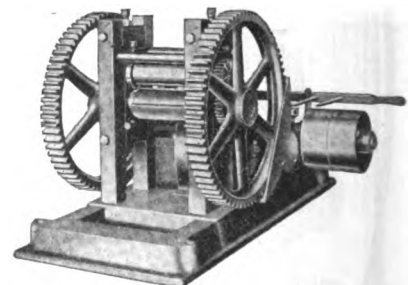
Our claims for the superiority of our TAPS and SCREW PLATES are based on actual performance. The rapid growth of our business, is proof positive of the excellence of our product.

Be sure you ask for BUTTERFIELDS, and take no substitute.

NEW YORK STORE BUTTERFIELD & CO. DERBY LINE,
126 Chambers Street VT., U. S. A.

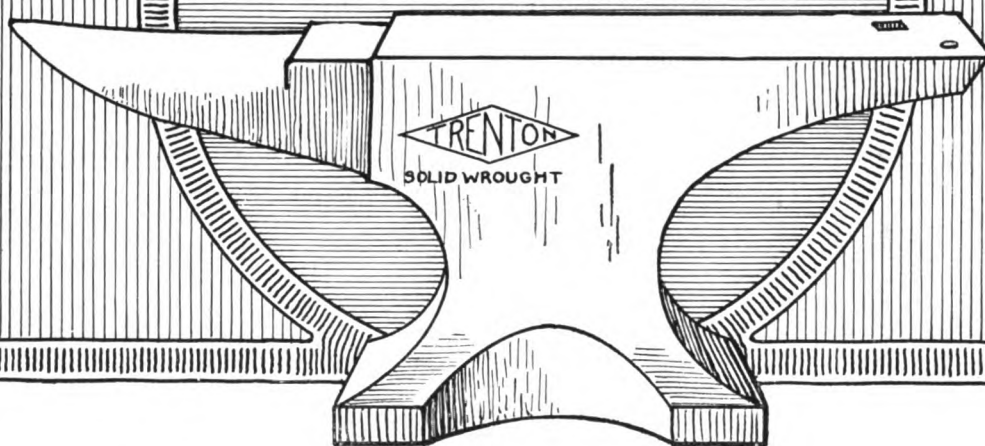
GONE!

These big bargains in **STURGIS SPRING LEAF TAPERING MACHINE** are almost gone. Just a few left! Here's your chance to compete with an auto spring factory with very little capital.
AXELSON MACHINE CO., Los Angeles, Cal.



TRENTON

SOLID WROUGHT ANVILS



***You'll be wanting
a new anvil soon—***

How about a Trenton?

Just stop for a moment and consider what you want in an anvil — steel with life and pep and virility, that'll stand up never failing, metal that'll take blow after blow year in and year out and still "ring like a bell" — *that's a TRENTON.* If you're looking for a real anvil, here she is—

Ask your Jobber — he knows

The Columbus Forge and Iron Company
COLUMBUS, OHIO, U. S. A.

Manufacturers of the famous "INDIAN CHIEF" Solid Box Vises

Replace Worn Thrust Washers on Fords and Chevrolet 490's with a **BAILEY BALL THRUST BEARING**

THRUST WASHERS at left of differential have a sliding, friction producing contact — therefore wear thin and cause drive gear and pinion to get out of mesh — resulting in broken gears.

—but the Bailey Ball Thrust bearing with its rolling, frictionless contact, does not wear—hence keeps gears meshed, preventing rear axle trouble and noise. Install Bailey ball bearings instead of washers.

Washers wear thin — with these results —

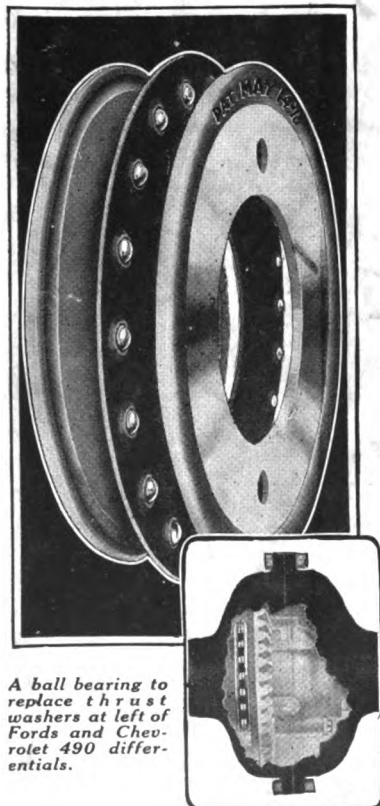
- 1—The ring gear and pinion get away from the proper mesh and allow a contact of the teeth at the weakest point. Result is broken gears.
- 2—The improper meshing of gears causes humming or noise in the axle. Bailey keeps gears meshed—hence no noise or breaks.
- 3—The friction of plain washers heats the oil and grease to such an extent that the lubrication qualities are destroyed.
- 4—The fine metal ground away in the wear of plain washers is bound to get into the other axle bearings and lessens their life and service.
- 5—When you get the heaviest thrust you get most friction—and friction means loss of power. The Bailey eliminates friction.

Your jobber knows how well this bearing sells — ask his salesman or write us.

FREE To Blacksmiths—

Fill in and clip the Coupon and we will send with our compliments a Thrust Washer Gauge — an indispensable shop tool to enable you to tell instantly before installing whether or not thrust washers are of correct thickness.

Mail the coupon.



A ball bearing to replace thrust washers at left of Fords and Chevrolet 490 differentials.

GEO. D. BAILEY COMPANY

Factory and General Offices

4505 Ravenswood Avenue, CHICAGO, ILL.

See our Exhibit at Truck, Tractor and Accessories Exposition,
Chicago Municipal Pier, September 14-21.

COUPON —
Geo. D. Bailey Co., 4505 Ravenswood Ave., Chicago
Please send me free of charge
Name _____
Address _____
gauge.

**This book is under no circumstances to be
taken from the Building "**

[illegible]

MAN 9.1915



